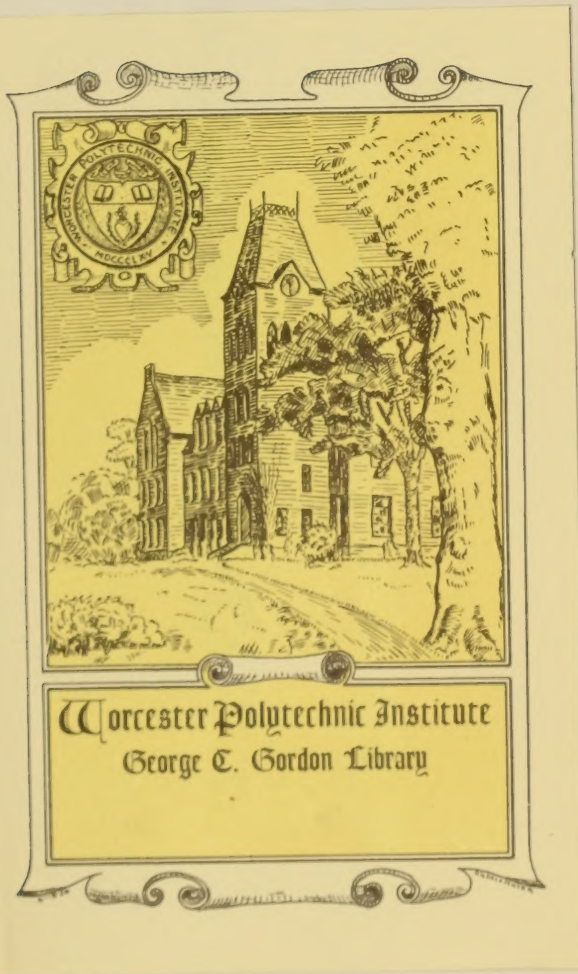

WORCESTER POLYTECHNIC INSTITUTE
MDCCCLXV
Worcester Polytechnic Institute
George C. Gordon Library

WPI JOURNAL

August 1973

The Theory of Alpha and Omega on Planet Earth

Wyman-Gordon is the country's outstanding producer of forged components for America's key industries. Wyman-Gordon has supplied forgings for virtually every aircraft in the skies today, as well as for the Saturn and other space boosters. Equally important is its production of vital components for nuclear and turbine power plants, sea and undersea vessels, trucks, tractors and construction equipment.

Research is a hallmark of Wyman-Gordon; its Research and Development teams have long been recognized as industry leaders in the development of new techniques for advanced materials such as titanium and other space-age alloys.

WYMAN - GORDON

Worcester—North Grafton—Millbury
Midwest Division: Harvey, Illinois

Subsidiaries

REISNER METALS, INC.
South Gate, California

ROLLMET, INC.
Santa Ana, California

ROME INDUSTRIES, INC.
Cedartown, Georgia

WYMAN-GORDON INDIA, LTD.
Bombay, India

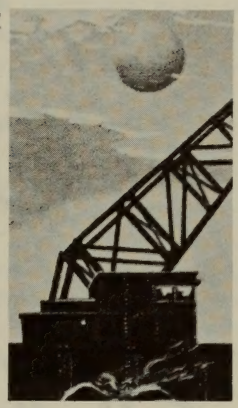
Sales Offices Worldwide

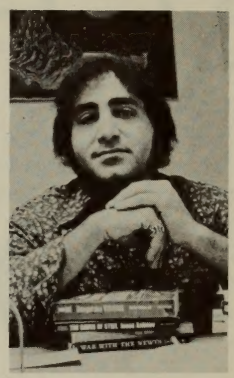
WPI JOURNAL
Vol. 77, No. 1 August, 1973

2 **The Theory of Alpha and Omega on Planet Earth**
20 **Reunion 1973**
21 **A Cry for Help** (i.e., a questionnaire)
30 **Boomer**
34 **New Association President's Hats for 3 Alumni**
36 **Mike Curtis' Low-flying Airplane**
40 **Good Luck Coach**
43 **Gosh kids . . . It's Captain Gary Time**

Departments

28 **Completed Careers**
32 **Your Class and Others**





The Cover: A literal interpretation of part of the Theory of Alpha and Omega (see page 2). The photograph of the earth was taken by the crew of Apollo 17, used by courtesy of NASA.

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, Chairman; Donald F. Berth, '56; Richard DeChard, '56; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography and printing: Davis Press, Worcester, Massachusetts.

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal*, Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1973 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. Postmaster: Please send form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

WPI Alumni Association

President: W. J. Bank, '46

Vice Presidents: L. Polizzotto, '70; F. S. Harvey, '37

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr., '44

Executive Committee Members-at-Large: C. W. Backstrom, '30; B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55

Fund Board: R. F. Burke, Jr., '38, Chairman; W. J. Charow, '49, Vice Chairman; L. H. White, '41; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

The Theory of Alpha and Omega on Planet Earth

copyright 1973
by Andreas and Annette de Rhoda

WITH THIS ISSUE of the *WPI Journal,* we break new ground. The article beginning here is distinctly different from anything ever before printed in the magazine. It is a thought-provoking piece which develops an entirely new theory of evolution, encompassing not only the physical evolutionary process as worked out by Darwin but the evolution of the human mind as well. It touches on science, on philosophy, and on religion.

Whatever we do, whether we are engineers, scientists, businessmen, housewives, or editors, the primary process which attends our lives and actions is that of information flow—learning, reacting, correcting, daydreaming, adjusting, confirming, denying, evaluating—all that we do involves the processing of information, either consciously or unconsciously. Technology, in the form of the electronic digital computer, has extended our collective capacity for information storage and manipulation to an incredible degree. But when we try to examine the effects of this information handling, when we ask the questions Why? and What Will Happen?, we find ourselves often without answers and into the realm of metaphysics.

This is what happened to Andreas de Rhoda, when, while working for IBM in 1963, he began studying the impact of computer technology and automation and contemplated the almost frightening rate of acceleration of technology. It was five years later that he met his wife, Annette Hall de Rhoda, who had spent eleven years in the study of comparative religions and religious experience. Attempting to bridge the gaping chasm between their respective viewpoints of technology and religious experience, the de Rhodas began exploring some of the basic human questions.

An award-winning journalist, Andreas has worked for IBM, General Dynamics, and United Press, and has served as a consultant to the governments of West Germany and to the State University of New York. During Intersession 1973, Andreas spoke on campus, and he is scheduled to offer a course in the alpha-Omega theory during Intersession 1974.

Developing their "Theory of alpha and Omega", validating its concepts, exploring its ramifications, and explaining it to others, has become the life work of the de Rhodas. This article is an outline, a precis, of their theory. To do it justice would require far more space than a year's worth of Journals could provide. The de Rhodas are working on a fuller explication of the theory in book form.

As you read this article, you may find yourself exhilarated, outraged, or befuddled. You may throw it down and consider it poppycock. But you just might find that it clarifies some of your own inner feelings, thoughts which you perhaps could never quite put into words, experiences which didn't quite make sense. I promise you, if you read through to the end, you will

have some very definite reaction to the theory of alpha and Omega.

WPI has become, in recent years, a pioneering sort of place. We are not content to rehash the old and familiar. We ask others embarrassing questions—and we ask ourselves, too. We do old things in new ways, and we do new things in different ways. We have done things which were called controversial, things called absurd, and things called prophetic. As to which category best fits this article, that is obviously up to the judgment of the future. Niels Bohr, the Nobel Prize winning nuclear physicist, once listened intently to a young scientist presenting a new theory. Afterwards Bohr said to him: "Your theory, young man, sounds crazy. The only question is: Is it crazy enough to be true?"

One last comment: If perchance you think this article inappropriate for the *Journal,* remember that the highest degree that can be earned from WPI—indeed, the highest scientific degree awarded by any university (with but a few exceptions)—is called the doctor of *philosophy* . . . not science, not engineering. Finally, I would like to join the de Rhodas in soliciting your reaction to this article. If there is sufficient interest aroused, then perhaps in a future issue we can continue the dialogue between author and reader.

—Russell Kay

Man is about to take a second leap in evolution. His first leap brought him out of animal awareness into human self-awareness. His second one will bring him into a still higher awareness, transforming him into a new species almost as advanced over man as man is over the dolphin and chimpanzee.

The transitional phase of this event, the time required for every human adult to understand its meaning and to decisively experience its effects, is likely to take no more than three decades.

The new species' behavior will be characterized by harmony, its intellect by genius. All conflict – physical, political, economic, religious, ideological, and emotional – will cease. Goods and services will become as universally accessible as air is now. Crime will vanish, law enforcement become unnecessary, government be reduced to service functions. Individual liberties will be unrestricted and unabused. Disease will disappear, along with the fear of death. . . and possibly, at some point in the future, death itself. Once upon a time this utopia would have been summarized as "the coming of the Kingdom of God on Earth."

If these predictions have a familiar ring, they have been uttered for centuries from intuitive foreknowledge. Today, however, man has the data and the concepts he needs to be able to look upon this event as an outcome of evolution rather than as a miracle. Science has not predicted this, partly because science has so far concentrated on the basic aspects of matter rather than on human behavior. Yet scattered throughout scientific and other literature and, indeed, throughout human experience, are the patterns and the evidence to support this prediction.

The new species can emerge quickly because it has been growing inside man's unconscious, like a butterfly in a caterpillar, ever since we became man, at least 1.5 million years ago. Its emergence into consciousness constitutes one essential part of the appearance of the new species – the new you, the new we; the new everyone.

The Speed-Up of Evolution

The process of evolution began extremely slowly, then suddenly accelerated at an extreme rate. This applies to the evolution of species (body forms) and man's behavior patterns as expressed in intelligence and creativity.

It was not until our own century that this enormous acceleration in both animal species evolution and human development began to be recognized.[1] Figure A shows the explosive acceleration in the volume and variety of plant and animal life over the 4.5 billion years Earth has existed: It took more than 4 billion years for the first living cells to achieve reproduction by sexual means; after that it took a comparatively short 600 million years to produce the variety and volume of life we know today.

Likewise it took man approximately 1,484,000 years (out of his estimated minimum of 1,500,000 of existence) to be

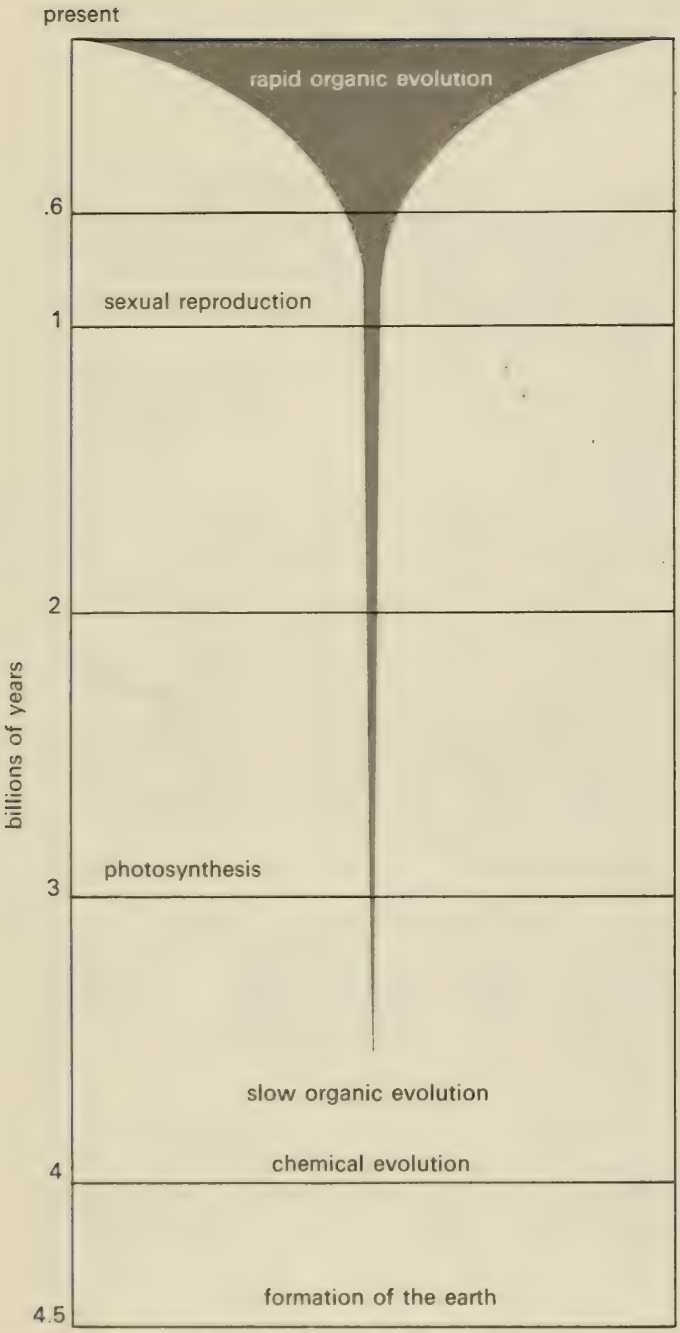


Figure A

Organic evolution on the Earth, as shown by the explosive increase of life forms in successively briefer episodes of biological advance. (Adapted from a chart in "The Oldest Fossils," by Elso S. Barghoorn, *Scientific American*, May 1971, p. 41.)

able to engage in agriculture, the economic basis of civilization. Then it took a mere 16,000 years to produce that modern civilization.

In Figure B1, the horizontal line stands for time, for the 1.5 million years of man's existence. The vertical line stands for the development of science and technology with the vast social changes resulting from it. To dramatize, we have borrowed biologist Robert Francoeur's device in fitting this time span into a regular calendar year: January 1 marks man's appearance; midnight December 31 marks the year 2000 A.D., now 27 years away; each day represents 4,000 years. This is how Francoeur sees this time span:

> Man's evolutionary progress was at best tedious and halting: fire first for protection from the cold and wild animals and only much later for cooking; tools chipped from stone; the skills of hunting; the slow concentration and involutions of the cerebral cortex. Summer came and went, and fall was two-thirds through its course when the Neanderthal man finally appeared around November 1. The first indications of religious belief can be seen in the burial sites of the late Neanderthaloids around December 1 in our scheme.
>
> By December 24 in our hypothetical year, all the non-sapiens or primitive forms of man had died out or been absorbed by the more progressive and modern Cromagnon man. Agriculture began around December 28 and the whole of our historical era, the brief six thousand to ten thousand years for which we have records, is nestled in the last two days of the 'year'.[2]

Figure B2 shows that the great empires of Babylon, China, Egypt, and Rome rose and fell in the morning of December 31. Socrates, Plato, and Aristotle lived around 9:30 a.m. Jesus of Nazareth was born at 12 noon.

Man's earliest tools and knowledge have a long history but the achievements that produced modern civilization in terms of technology and science are a mere four centuries old; all this took place in the last three hours of New Year's Eve. At 8:57 p.m. Columbus discovered America; at 9:16 Copernicus proved the Earth orbits the sun; at 10:27 Watts perfected his steam-engine; at 11:09 Darwin and Wallace proved man evolved out of primitive life forms; 11:41 Fermi split the atom; 11:42 the first computer was built; Sputnik went into orbit at 11:46 and the first man landed on the moon three minutes later. The time is now 11:50.

This acceleration of the evolutionary process will continue. The question which we are attempting to answer here is: Where is this process headed and why?

The research which lies behind this article was prompted largely by personal experiences. Some were psychic, involving extrasensory perception (ESP); some were of the more traditional religious type; others came as intuitive ideas in the form of abstract mental pictures which offered fresh and promising insights. As we began to read in related fields, such as psychology, psychical research, biology, philosophy, and theology, we came across countless data and concepts which fitted into the overall developing picture, the jigsaw puzzle

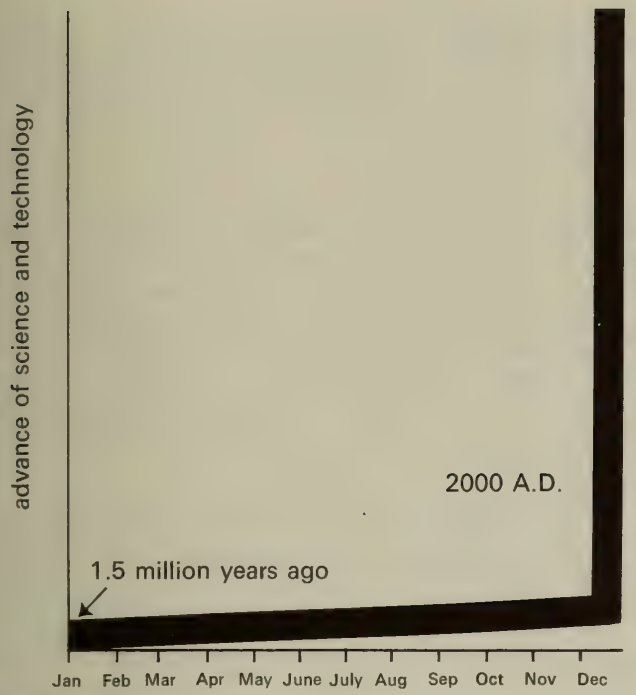


Figure B1

Scientific and technological advance during man's 1.5 million years of existence, expressed as a single year. One month = 144,000 years, one day = 4,000 years. Although no specific quantitative units are given for the advance of science and technology, many different measures could be used: available power per capita, speed of communication and/or transportation, per-capita consumption of goods and services, for example.

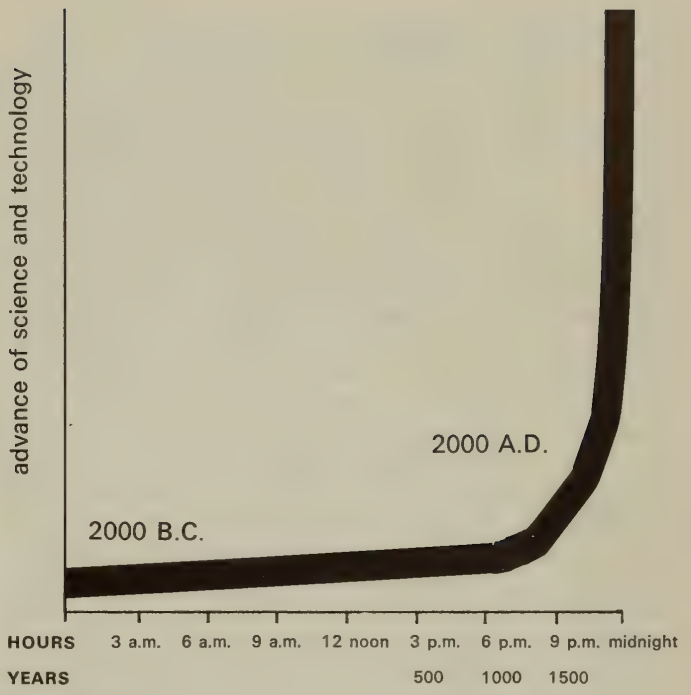


Figure B2

The last "day" of the evolutionary "year" of man, an expansion of the last part of Figure B1.

which was being assembled from our hunches. The outcome of this work we call the "Theory of alpha and Omega." In the following pages we will try to describe it in brief outline.

A New Earth

Taken together, the mosaic of our intuitive glimpses and other findings shows the Earth as a fully automatic, living, information-processing system which is centrally controlled, centrally evolving and learning, and centrally arriving at certain evolutionary breakthroughs. What we see in fact, is a living intelligence existing on a global scale – a giant "brain" or, as we prefer to call it, a biocomputer. (This is not a unique view; Edward Fredkin of MIT and others have been quoted as speculating that the universe might be "a cellular automaton run by a giant computer."[3] Within the "memory banks" of this biocomputer, no event or knowledge or experience or individual human being who has ever existed has been lost. They are all still here, either alive now or "in-between lives."

We believe that as man discovers his individual historic past, the identity of the planetary "psyche," and the process of biological evolution, he will inevitably be changed, transformed; and this is what we describe as the second leap, man's emergence into a new species.

Many aspects of this view of life are not new; religion and philosophy, the parents of natural science, have described them with remarkable precision. What is new is the realization of life's fully automatic, cybernetic,* accelerative process, the discovery of why the long-predicted transformation of human life could not have taken place in the preceding 1.5 million years of human existence and yet *will* take place in the next thirty years.

*Cybernetics: The comparative study of the automatic control system formed by the nervous system and brain and by mechanoelectrical communication systems and devices [as computing machines, thermostats, photoelectric sorters] – Webster's Third New International Dictionary, 1970.

Alpha and Omega

We regard the earth as a planetary biocomputer; we call it "Omega."† Man too is a biocomputer, and so are the members of all species. We call the human biocomputer an "alpha."

Alpha and Omega are in constant interaction with one another. Each individual alpha receives information from its environment and processes it against information already stored in its memory, thus producing new information which it also stores. The alpha feeds all its information to Omega. The planetary biocomputer runs this information off against its incomparably larger memory, in turn producing more new information which it stores and transmits back to the alpha; it also shares a part of this information with other alphas.

Everything an organism does, thinks, feels — in short, experiences — is processed in Omega as well as in the alpha, down to the minutest detail. Alpha memory thus includes the individual's entire experience. The alpha's information content controls the individual's functions and behavior in every detail. And since the alpha's content also includes the constant alpha-Omega information flow, each individual's behavior and experience are controlled by both Omega and alpha.

To facilitate this alpha-Omega communication and control, every alpha must have a specific point of connection (call it a "storage address") with Omega. Through this point, all alpha-Omega information clears; in it all is stored. Similar specific memory addresses exist for the alpha's species, subspecies, and for other groups (such as family, clan, community, nation, etc.) to which the alpha belongs, whether permanently or temporarily. The behavior and evolution of alpha groups thus is controlled through such communal information centers in Omega.

Energy and Non-Energy

In order for an intelligence the size of Omega to operate, it must have a mechanism of communication within itself and within its alphas. For many obvious reasons, this cannot be any form of energy that current physics is accustomed to dealing with. Therefore we must postulate a field of *non-energy*, or *XYZ* as we will call it because we know it only by the way it operates. In order to function as a medium of communication in Omega, XYZ must have the following five characteristics: (1) it is both information and information processor; (2) it is directly related to energy and matter in all their forms; (3) XYZ information represents all conceivable experience and data; (4) XYZ information storage is permanent; and (5) it transmits information instantaneously, regardless of distance

†We use the first and last letters of the Greek alphabet because the Bible uses them fittingly (Revelation 1.8) and in honor of Pierre Teilhard de Chardin, whose concept of a planetary or cosmic energy psyche created by the pressure of ever-growing consciousness inspired our early research.

1. XYZ is both information and information processor. An XYZ field works in principle like an electronic digital computer, but it has no parts — no matter and no energy. It is, in fact, the "stuff" from which Omega and alpha are made and through which they exist.

2. XYZ is directly related to energy and matter in all their forms. Life's operation as viewed by science represents a continuous process of energy conversion. In our view, energy conversion is represented by specific, parallel XYZ information processes. Every act of a person, for example, has a specific XYZ-information equivalent in his alpha. Thus, when a man throws a stone, he converts chemical (food) energy into mechanical (motion) energy under the direction of his brain (electrical energy); this action is parallelled — and controlled — by an XYZ information process in his alpha.

Nowhere, however, is XYZ's relation to energy and matter more readily evident than in what are sometimes called psychic or ESP phenomena including psychokinesis, levitation, and the inexplicable cures (sometimes of "incurable" diseases) produced through such diverse means as "suggestion," "telepathy," Christian Science treatment, prayer, and spontaneous "miracle" cures recorded throughout history.

All ESP phenomena involve psychic energy, a form of energy about which science knows very little as yet. Psychic energy may be visualized as being halfway between known forms of energy and non-energy (XYZ).

Psychokinesis, "the production or alteration of motion by influence of the mind without somatic intervention in objects discrete from the subject's body" (Webster's Third New International Dictionary, 1970) has been demonstrated in television films of a Soviet woman psychic who moves objects with her "mind," under scientific observation.[4] *Levitation*, the elevation of the human body from the ground without physical force or support, is so well documented that, in the view of a scholar writing in the Encyclopaedia Britannica, "this evidence would indeed be regarded as overwhelming if the phenomena were intrinsically more likely. . . to. . . the mind accustomed to scientific habits of thought."[5]

The same statement, in our view, applies to most other psychic phenomena or extrasensory perception (ESP), including out-of-body travel, retrocognition, precognition and perception of auras. *Out-of-body travel* is being studied in a laboratory of the American Society for Psychical Research in New York.[6] Data on *retrocognition*, the perception of past events, and *precognition*, the perception of the future, is so plentiful that there is hardly any more question about its existence. The *aura* has been associated with the "bioplasm" rediscovered and studied in the last decade by Soviet scientists. The bioplasm is an energy field of constantly changing light and colors; it has been associated directly with health, sickness and emotions; it has been used to diagnose disease months before it appears in the body; its "flare points" have been linked to the needle-application points of Chinese acupuncture.[7]

3. XYZ information represents all conceivable experience and data. This includes five-sense data — sight, sounds, touch, smell and taste — and kinesthetic (inner organic) sensations. XYZ's ability to handle all these types of experience is illustrated by the large volume of ESP cases in which these sensations were transmitted between two or more individuals telepathy.[8]

Five-sense data transmission by telepathy illustrates with particular clarity the relation between XYZ and energy, including psychic energy: A word, a scent, or a touch transmitted telepathically is first converted into XYZ by the sender and thus transmitted to the receiver. The receiver in turn reconverts it into psychic energy and into whatever general energy form is required, such as the chemical substance of the scent, the sound vibrations of the word, or the sensation of the touch.

4. XYZ information storage is permanent. XYZ information cannot be erased, does not decay, and does not change content when used to compute new information; a "copy" of each transaction is kept "on file." XYZ information permanency is illustrated by documented retrocognition of historic events which were otherwise unknowable to the percipient.[9]

5. XYZ information transmits instantaneously, regardless of distance. Unlike radio or light, XYZ transmission does not consume time. It is received the instant it is transmitted, even over cosmic distances. Because of this, Omega's operating speed is unlimited, and so is the number of alphas it can communicate with. We had assumed this characteristic of XYZ from the start of our work, along with the other four. We later learned that Nikolai A. Kozyrev, astrophysicist at Pulkovo Observatory, Leningrad, principal observatory of the U.S.S.R. Academy of Sciences, some years ago experimentally demonstrated a factor which transmits information over any distance instantaneously; it appears to be identical with what we call XYZ. Kozyrev calls it "time" itself. His report is available from the U.S. Government Technical Information Service.[10]

It is XYZ's instantaneous transmission that enables Omega to communicate simultaneously and specifically with each of billions of human alphas. This is illustrated by the time-sharing electronic digital computer, with which we are all familiar. Such a computer, linked to several dozen remote terminals, communicates with each terminal, one at a time. The fact that none of the terminal users gets the sense of having to wait for the machine to respond, lies in the machine's high operating speed of more than one billion separate sequential operations each second. Yet the number of terminals with which the computer can effectively communicate is limited by the size and storage capacity of the computer and the speed at which electrical signals travel throughout the system.

Since XYZ's transmission speed and storage capacity are unlimited, the number of alphas with which Omega can communicate, is unlimited.

XYZ Information: Programs and Data

XYZ information consists of "data" and "programs," words borrowed also from computer technology. In computers data is the raw material, the information which the machine is to process into new combinations or solutions; the program is a set of instructions which tell the machine just how to process the data, step by step.

Electronic computer memories contain large numbers of programs. They can be viewed as being arranged in hierarchies in which groups of instructions are controlled by an instruction higher up, and groups of these, in turn, are controlled by further higher-ups. Without a program, a computer cannot do anything, no matter how rich its content.

A biocomputer, then, depends on both, programs and data. An alpha's body shape and behavioral complexity are determined by its content of programs and data.

Every life process requires data and programs; the simplest body function, such as blinking an eye or moving a limb, calls on a hierarchy of programs in XYZ-content, translated into electrochemical processes. It is thus apparent how complex the XYZ-content of a wasp must be, how gigantic that of the human being and how incomparably greater that of Omega. When we refer to "information" in this article, we mean XYZ information which includes both "XYZ programs" and "XYZ data."

Optimization

A biocomputer invariably makes the best possible use of the information it contains: it "optimizes." Even if it maximizes or minimizes the use of any particular information item, it does so to optimize. The greater the information content, the greater the capacity for optimization.

Optimization explains many aspects of evolution, particularly the mixture of destructiveness and creativity which has characterized homo sapiens and so sharply distinguished it from all animals, and also, humanity's simultaneous emergence into the higher species.

Omega uses any and all information which advances and protects the development of the planet in general and of the self-aware alpha species in particular, regardless of whether this involves conflict, destruction, and suffering. All Omega "cares" about, as the automatic cybernetic non-personal information processor and controller it is, is to bring mankind to its second leap of awareness in the fastest possible way. This is why Omega optimization has included wars which, we logically conclude, must therefore not have interfered with man's development but advanced it — but has not included any measures which would threaten the earliest possible second leap, such as the stopping of body reproduction or a war of such scope that it would interfere with the planet's safety and the health of its physical biosphere. (We believe a thermonuclear holocaust is not possible because it would be counteroptimal, and that anything running counter to optimization is, by definition, impossible.)

Man's Individual Historic Continuity

Since XYZ information storage is permanent and since each alpha has its individual Omega address, this address is permanent. When a human body dies, its alpha maintains its identity in Omega storage: the purely personal information (character, skills) representing its life-time experience is not integrated with that of others. After a reprocessing period (which we will discuss further) the alpha returns to physical human life.

Man has two distinct and separate paths of ancestry: (1) the genetic path, the chromosomal information passed on through his physical parents from a collective pool of billions of forebears; and (2) the alpha path, which is passed on, through Omega memory, from a much smaller line of ancestors each of whom was the alpha's life at another time and place.

Why do we not remember our alpha past? The answer lies in the alpha's structure, in the reprocessing in Omega between lives, and in the optimization of self-awareness which until now has kept such memories unconscious for specific evolutionary reasons.

Levels

As XYZ-information content built up through eons of evolution, it arranged itself into different levels of storage and processing in the individual alpha. These levels function as one but are distinct and must be so understood. There are five levels: the **basic non-overt,** the **self-aware past non-overt,** the **present-life non-overt,** the **overt** and the **pre-overt,** in their order of evolution.

1. The **basic non-overt (bano)** exists in biocomputers of all species, including nonorganic substances, molecules, and subatomic particles. In a human alpha, it is its total evolutionary past prior to self-awareness. The bano also contains the alpha-Omega link, the clearing house through which alpha-Omega information flows.

2. The **self-aware past non-overt (sap)** contains all experience of the alpha's past lives as a human being, integrated into one level but with all past-life information and experience separately and distinctly available for processing.

3. The **present-life non-overt (plino)** contains the alpha's present-life experience; it is also the primary learning level. It processes not only what comes in through the overt, but also all "subliminal" information, anything that slips in past overt awareness.

4. The **overt** contains whatever information the individual is overtly aware of at any moment. The writer putting this paragraph together is overtly aware of the typewriter printing out letters across the page, the touch of his fingers on the keys, the thought of communicating this idea to the reader and his curiosity about the reader's response, and the start up of a car engine outside the window. Since overt attention refocuses frequently, overt content changes frequently. (We avoid psychological terms such as "conscious" and "unconscious" for the same reason we avoid philosophical and other specialized language: they are subject to wide disagreement and do not fit our concepts precisely.)

5. The **pre-overt,** the last to evolve, contains whatever part of the plino is accessible to the overt from moment to moment, whatever it can "remember." This would include, for example, the individual's name and thousands of other items.

We see remembering not as a search conducted or initiated by the overt but as an information release controlled by the plino and deeper levels. The pre-overt, too, constantly changes in content: when one cannot readily remember something it is because the underlying alpha-Omega control does not release that information for some reason. Information release or "overtization" is purely a function of alpha-Omega interaction. Even when non-overt plino or sap information is made overt by hypnosis, for instance, the alpha's deeper levels release this information because they agree to do so.

Nevertheless, man experiences this process as overtly initiated because he looks at himself and the world from an almost purely overt point of view. Our theory sees the alpha's operation, learning, and evolution the other way around.

While the pre-overt is generally thought of as man's "memory," it is evident to us that this is but a minor fragment of it. It is vital because it "binds" sap self and plino to the overt and thus makes overt awareness and self-awareness feasible.

The animal, too, has a pre-overt; it could not function without it. A bird which has just selected a place to nest and flies off to get twigs for building material, would not find its way back if it lost pre-overt information release on the way. It would still be able to fly, randomly feed and perform other skills because these are actions carried out without pre-overt involvement, once they have been acquired or inherited. The human plino demonstrates this in an interesting way pointed out by Arthur Koestler:[11] we need the pre-overt to learn a new skill, that is to store its learned performance in the plino. But we don't need and want the pre-overt in performing the skill: a pianist can continue a tune while talking to someone. But if his playing were forced into the overt by some reference to it, it would probably slow down or even stop momentarily.

The human pre-overt's primary function, then, is self-awareness and the acquisition of knowledge and skills.

Figure C shows the human alpha schematically as a cone seen in cross-section so that it looks like a triangle. No scheme, however, can illustrate the proportional shares each level holds. To indicate the disproportionateness of these level shares, we might cite a set of figures (purely imaginary and only for illustration of our point) in which the bano takes up 10 per cent of the total alpha content, the sap 80 per cent, the plino 9.999 per cent, pre-overt 0.000999. . . per cent, and the overt an infinitesimally small portion.

All XYZ communication travels between bano levels; in the rare instances such an XYZ message emerges into the overt awareness, it is called an ESP phenomenon.

Figure D shows schematically how the alpha communicates with Omega — and other alphas — through the alpha address.

Self-Awareness and Level Selves

Human self-awareness arose when the pre-overt function developed to the point when man could overtly recall his experience sufficiently far back into his individual present life to see himself as living in a flow of time, to be aware of the

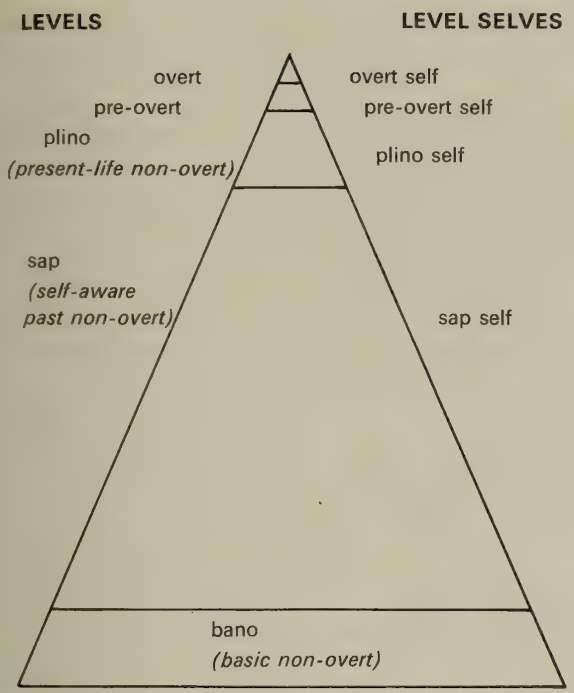


Figure C
The structure of the alpha seen as a cone in cross-section.

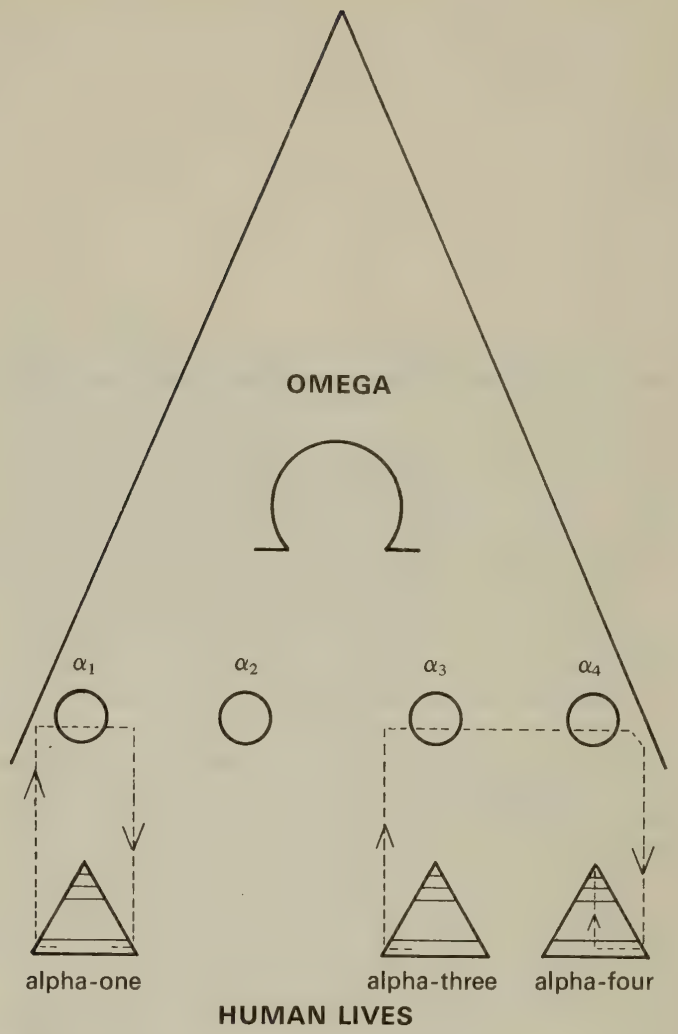


Figure D
The interaction between alpha and Omega, graphically represented. The circles near the bottom of the Omega figure represent the "alpha addresses" in Omega, through which all alpha-Omega XYZ communication takes place.

At the left we see a representation of XYZ information flow from the bano of alpha-one to the "address"(α_1)in Omega, where the information is processed and the results sent back to alpha-one's bano.

At the right, we see how the XYZ information from alpha-three is processed in Omega (viaα_3)and then transmitted on to alpha-four (viaα_4)where it enters through alpha-four's bano and, in this case, emerges through the higher levels into alpha-four's overt awareness. This might represent an example of telepathy, for although in this diagram we show alpha-three and alpha-four as being next to each other, in actuality they could be at opposite ends of the earth. Note that such XYZ flow from one alpha to another rarely surfaces into overt awareness; nearly always it remains at one of the lower, non-overt levels.

Finally, α_2 represents a human alpha which is "between lives," being reprocessed and level-integrated in Omega.

---

past, present and future, to be aware of himself and of being aware.

The sequence of level evolution is shown in human maturation: at conception, the plino and the overt are formed; the pre-overt develops more slowly. When it has sufficient information to release, the child is able to distinguish its environment from itself and becomes self-aware. Development of awareness and self-awareness continues all through life.

Two aspects of evolution are experienced daily: the dawn of awareness and self-awareness. In sleep, pre-overt and overt submerge in the plino for purposes of information processing and level integration (as in death, but only partially and

temporarily). When awaking, we may have the sense of first waking to a kind of animal awareness and then to full self-awareness.

Self-awareness, paradoxically, can be non-overt. While man is self-aware, through his overt and pre-overt, all but one of his other levels have self-awareness in non-overt form. Each is a "level-self," overt or non-overt.

The "overt self" is what we think and feel about ourselves at the present moment and what we think others think or have thought about us. The overt self can fluctuate rapidly; moods change quickly.

The "pre-overt self" is the sum total of what we can readily remember (by information release) having overtly experienced ourselves to be in our present life. It, too, changes: in happy moods, we tend to associate ourselves with happy past self-identification; in unhappy moods with the opposite.

The "plino self" represents the large assortment of self-identifications in our present life which we cannot overtly recall. It has a powerful role in our emotions.

The "sap self," finally, constitutes the sum total of all selves experienced in all our past human lives, computed and integrated into one. It is incomparably the most important self; it is the essence of our person, rooted in human history, a marvel of integration and identity, the "I" in the true sense. But it does not appear overtly; moreover, plino self and Omega optimization greatly affect its operation and thus its behavior.

Man's psychological problems — the inner contradictions and conflicts that tear at him — are rooted partly in the fact that he is not aware of his sap self and that his upper present-life selves are out of tune with his sap self.

Below sap, there is no humanness, no self, overt or non-overt. The bano has the qualities of sub-human evolution through animal, vegetable, and mineral states.

Past-Life Memories: Retention and Release

When a human dies, its alpha, always "up-to-date" in Omega, is reprocessed by integrating the three top levels into the sap. This leaves the alpha with just two levels, sap and bano.

At a time and place determined by Omega optimization, the two-level alpha is attached to a newly conceived human embryo and born into a human life. As new levels begin to form through interaction with the new environment, the sap is sealed off with respect to three top levels: while it uses its content to control alpha behavior, it does not let this information appear in the overt, it does not betray its presence.

There are exceptions — past-life recalls clearly and overtly experienced and recognized as such. Past-life recalls have been proved in the first scientific study of this phenomenon published in 1966. The author is Dr. Ian Stevenson, former chairman of the psychiatry department of the University of Virginia, now head of its parapsychology (psychical research) department.[12] Dr. Stevenson describes twenty cases of children, a cross-section of more than 600 cases known to him and his colleagues. Most items of recall were verified by on-the-spot investigation at the scenes of the children's preceding lives. After weighing other known psychic phenomena which might explain some of these recalls, Dr. Stevenson concludes that the only one to explain all is survival of death and subsequent rebirth with retention of individual identity.

Many of Dr. Stevenson's cases appear to involve a premature rebirth in which level integration was not completed. As a result, plino content was carried over into the present life and communicated as the children were able to talk. These recalls began at an average age of 2.6 years and ceased at an average age of 6.9 years. Childhood recalls have the value of not being easily suspect of fraud, hallucination, or of accidental, subliminal present-life exposure to information. Premature rebirth also is suggested by the fact that some of these cases involve birth defects and birth marks traceable to injuries incurred by the individual in the preceding life or inflicted, as in one case, on others.[13] Thus level integration may also serve to prevent past-life body injuries and diseases from reappearing in the new body. Our own research suggests that the body is formed not only of parental genetic information but also out of sap content; past-life facial features, for instance, are sometimes carried over.[14]

The major function of level integration aside from this one is to block past-life memories for reasons of psychological optimization: A vision of past-life experiences, with all their suffering and horrors as well as pleasant aspects (not to mention the additional "identity crisis" induced) would have seriously harmed the human psyche. Thus sap content has been kept non-overt.

Yet it is for this same reason that past-life recalls *will* become universal in the years to come. Instead of hurting man's emotional life, they will free him and assist in his transformation.

The Making of the Future

Just as we use computers to make predictions, alpha and Omega also make predictions or precomputations. Omega precomputes its own and the alpha's future; historical evidence suggests that it does so at least two thousand years ahead in basic outlines.[15] Details may fill in as the future comes closer. There is evidence that the minutest details of any event are precomputed at least months ahead of their actual occurrence.

Precomputation is evidenced in precognition, often presented in pictorial flashes. Precognition cases abound. Mark Twain dreamed that his brother had been killed and was lying in a metal coffin, a bouquet of white flowers on his chest with a red blossom in the center. A few weeks later that is what he saw when he went to visit his brother's body killed in a boiler

explosion on board a Mississippi steamer.[16] A particularly impressive case is the death of Robert Morris, Sr., the father of the "financier of the American Revolution":

> Having dreamed that he would be killed by the firing of a cannon from a ship he was to visit, he tried to avoid going on board the ship. His grounds for such reluctance seemed so absurd that he was eventually persuaded by the captain that it was entirely safe to board the ship as no (salute) guns would be fired until after he left. At the end of his visit, the captain ordered that a saluting gun should be fired only after he raised his hand when the party, including Robert Morris, had safely reached the shore. But as the captain's boat was still within range of the gun, a fly lighted on his nose, and he raised his hand to brush it off. This was taken by the ship's gunner as the signal to fire and a fragment of the discharge hit Robert Morris and wounded him fatally.[17]

This case highlights the precision of precomputation: hundreds if not thousands of major and minor details had to function within fractions of a second in just the right combination — including the movement of that fly.

The massive mountain slide at Aberfan, Wales, October 21, 1966, which killed 144 persons, mostly children attending school, was precognized by at least 24 people in various locations.[18] The sinking of the ocean liner *Titanic* in 1912 was precognized by many passengers and nonpassengers.[19]

Jules Verne, 100 years ago, fictionalized the voyage of three Americans around the moon on a Christmas Day, taking off from Florida.[20] On Christmas Day 1969, three American astronauts circled the moon, launched from Cape Kennedy, Florida.

Vanga Dimitrova, a Bulgarian woman, has established a statistical volume and accuracy (80 per cent) of precognition which has led the Bulgarian Government to put her on its payroll to permit scientists to study her work. She has predicted the death of a number of individuals to the day, as far as fourteen years ahead of time.[21] A four-year-old child we know once dreamed that her girl friend would die on that friend's tenth birthday, several years hence; the dream proved correct.[22]

Free Will vs. Determinism

Precognition results from the precomputed future information reaching the alpha through the alpha-Omega link and surfacing in the overt. There are cases where precognized events seem to materialize in decisively altered ways: an accident "seen" as fatal, for example, may turn out not to be fatal.[23] These cases have an evolutionary learning function; we believe they serve to provide man with evidence of precomputation while modifying the emotional effect so as to suggest some kind of residual overt "free will," or ability to govern one's fate overtly. These cases do not represent a change in the future, either by human overt, alpha, or Omega decision. The future, in our view, is unalterable.

This may resolve the ancient controversy over whether man is free to determine his fate or not; in the α-Ω Theory, he is both. He is free because his deeper and decisive evolutionary self, sap self, invariably agrees with Omega precomputation; he is determined because that same agreement, in effect, amounts to Omega controlling alpha experience. From the viewpoint of optimal evolution there could be no more intelligent and self-interested decision than to abide by Omega precomputation for it assures the alpha of its best possible future whether it realizes this overtly or not.

While "direct" precognition experienced as visions etc., is relatively rare, "indirect" precognition (as we call it) is common. Every time an individual does anything he or she has intended, planned or hoped to do, he or she has acted on indirect precognition of the precomputed future, to the extent that the actual experience conforms with the planned one. This is the difference between "success" and "failure": the person more than usually able to carry out his or her plans is the person more than usually capable of indirect precognition; the less successful person is less indirectly precognitive. From the evolutionary standpoint, both are equally successful; both are realizing their best possible experience at the moment.

The overwhelming majority of things we plan to do from day to day and moment to moment we do carry out more or less according to plan and we have therefore succeeded in precognizing indirectly — rising from sleep on time, going to work, finishing chores, sitting down, getting up, carrying out intended body movements, etc., etc. Every human therefore obviously possesses a tremendous degree of indirect precognition. This is the root of man's persistent conviction, and his relentless attempts to prove, that he is overtly controlling his destiny, evidence to the contrary and the conclusions of philosophical determinism — ethical and logical — notwithstanding.

It follows that whatever a man does or does not do — intelligent or stupid, kind or cruel, constructive or destructive, beautiful or ugly, good or bad — is the only thing he or she could possibly have done at that particular moment, notwithstanding moral and other judgments attached to it.

Our Future in Omega

Realization of alpha-Omega control would have added intolerable suffering and despair had it appeared universally and fully, centuries or even decades ago. Yet this discovery's time has come now, for one overriding reason: man's future from here on is marked by such rapidly growing brightness that this understanding will help rather than harm him. Man has come to the end of his labor and his pain — the suffering resulting from the growth of the new species within him. Now the overt understanding will help us bear the residual adversities of our remaining few years of destiny as homo sapiens with increasing equanimity and cheer.

It is the intuitive understanding of the Alpha-Omega process which has enabled true mystics and saints to accept with joy and eager cooperation all that life offered, whatever the offering turned out to be. Rainer Maria Rilke, poet, said: "Accept life, for, believe me friend, life is right."

Man is about to realize that his "salvation" lies in the full overt recognition of Omega optimization and control. (If that Omega control disappeared suddenly, he would be confined to reenact his alpha's present mix of past memories; being a biocomputer, he would be condemned to act out solely the XYZ-information he possesses at that moment; he would be stuck in time as a needle on a cracked phonograph record is stuck in tune.)

Christianity's "predestination" was a religious adaptation of philosophical determinism and was rooted in psychic personal experience. It lacked the comprehension of the alpha (birth-death-rebirth) cycle and the understanding of the effect of information flow, of the alpha's — and Omega's — ever growing information content and thus of the creation of new behavior and experience. It could therefore not foresee the result of the continuous and relentless generation of new information, the process which ultimately and simultaneously produces a radically new behavior and species, with neither a vanguard to lead nor stragglers struggling behind, a world of neither saints nor sinners.

The Biblical parable of equal pay for both the early and the late workers coming to the vineyard may have a symbolic relevance here: we assume the early hired may represent those alphas who emerged into self-awareness slightly earlier than others and who therefore had somewhat longer self-aware experience. They, however, will be paid no more and no earlier than those who came later. All will emerge into the new species at one and the same point in time. In fact there is a delightfully ironic touch to the happy end of that parable which may make it worth rereading.[24]

Level Evolution in Omega

Level formation, with its resulting self-awareness, is produced, as we have shown, by XYZ information growth. It follows that the larger the information content, the greater the biocomputer's self-awareness. It also means that the first biocomputer to become self-aware was not a small alpha, however far developed, but was the largest existing biocomputer: the first person on Earth to discover itself must have been Omega-Person

The dawn of self-awareness in the planetary biocomputer must have preceded the appearance of man by a long time, possibly many millions of years. How can we visualize self-awareness in a biocomputer whose body is the planetary mass itself and which therefore has no organs of physical perception? We have mentioned that the human alpha, after death, undergoes a process of integration of its various levels. In that process, the alpha is likely to be quite self aware. Thus self-awareness is possible without the possession of physical organs of perception. (By this we do not mean to imply that man could have evolved without living in the body, or that he might at some future point continue evolution without a body; not at all. We merely want to suggest that Omega-Person does not need physical organs to perceive itself or its environment; its perception is a process of XYZ communication only.)

Let us look at Omega-Person's levels: Its basic behavior control lies in Omega-Bano, just as the alpha-person's basic control lies in the alpha bano. Thus Omega-Bano controls not only all alpha's behavior and evolution; it also controls the behavior and evolution of Omega-Person.

Sap Self is the sum total of Omega-Person's non-overt past since becoming self-aware. (Since Omega-Person has only one life, it obviously has no present-life non-overt, or plino; its Sap Self is its only non-overt self.) Pre-Overt Self is Omega-Person's identity based on what it can overtly recall itself to be from moment to moment. Overt Self is what it is aware of being at any one moment.

Thus Omega-Person consists of three levels. The fourth, Omega-Bano, is Earth's central information-processing and control center; even though it contains all alpha addresses, including human ones, it has no planetary self or personality to it. Before its own second leap (which we will describe in a moment), Omega-Person's self-awareness was basically comparable to that of a human alpha, although, of course, incomparably greater in content.

Human Awareness of Omega

Since alpha-Omega communication flows into the alpha through its bano, the character of Omega as a whole has been contained in the bano of all species as a kind of "image" since the start of evolution. Thus as Omega evolved into a Person, its image in alpha banos evolved accordingly.

After man appeared, it was a matter of evolution before the Omega image began to emerge, in brief flashes, from the human bano into the overt. This momentous experience, possibly accompanied by psychic-energy phenomena such as visions and voices, profoundly affected the character of the human percipient.

Among the recipients of such illumination were the founders of Earth's religions, from the earliest to the latest. This is why all religions share certain basic insights; this is also why, beyond those basic insights, they differ so sharply. Each recipient experienced Omega in a way determined by his or her own individual development stage and cultural environment and by Omega's own stage of development at the time.

Some percipients saw Omega as one, some as two, many as three, others even as four; some saw it as feminine, some as masculine, still others as both feminine and masculine. Some saw it as self-aware, others as not self-aware, still others as nonpersonal, life-spewing, life-devouring monstrosity. These

divergences sprang from contact with different Omega levels; the latter obviously was due to contact with Omega-Bano with its dispassionate (and one may well say ruthless) administration of alpha birth, death, and rebirth.

All religions have made specific contributions to man's comprehension of alphas and Omega, each representing a different view of the same or different aspects at different times and all undergoing more or less significant and continued developments and changes.

It is in the history of religious revelation and specifically in the communication between Omega Overt Self and the overt human level, that the limited awareness of Omega Person prior to its second leap is apparent. Its utterances show that it saw itself as both, creator and ruler of the world, a conclusion that stemmed from misinterpretation of its experience. For example, Omega Person's frequent precognition of events may have led it to conclude that these events were caused by its own overt will. This is an experience which, when encountered by humans, feeds belief in mental magic even today.

Omega-Person's unawareness of Omega Bano control also led it to regard itself – and man – as having overt free will. When man failed to obey Omega Person's commands, it became angry and threatened to punish its seemingly disobedient creatures.

The Nature of the Second Leap: "In-body Level-integration"

Before we discuss Omega-Person's second leap, let us see just what the alpha's second leap will be like. In the transformation of the human species, the individual discovers his or her own deeper levels and level-selves, his or her bano link to Omega, his or her alpha-Omega control, and his or her experience of the presence of Omega as a Person.

As a result of the gradual "overtization" of plino and sap selves, they both then merge in the new "alpha-self," the identity of the new species. Man, drawing on his past-life memories, will look out on life from the roots of history, personally experienced and remembered. He will be devoid of emotional conflict within or without.

The key to the new behavior and experience, however, is not the mere fact of non-overt information becoming overt; it is the fact that the species has reached the precomputed point at which behavior *is* becoming harmonious. If one wanted to relate this as cause and effect, one could say that the non-overt levels open up *because* mankind has arrived at the point of its behavior as a new species. This runs counter to traditional psychological interpretation, and that is why this is important to understand.

The alpha's second leap thus can be described as a "partial level-integration" while in the body, much more profound than that of sleep and much less profound than that of after-death level-integration. It is this new partial, in-body level integration that makes the possibility of the ultimate cessation of death plausible. Death's function has been to speed up evolution by periodically enabling the individual to make a completely fresh start. Once the species integrates its levels while in the body, however, the necessity of human death may indeed no longer exist. This point may be reached soon or it may be centuries away. But when it is reached we do expect it will be reached by all humans more or less simultaneously. Evolution does not permit two human species to live side-by-side just as it does not allow pre-leap and post-leap species to communicate across interplanetary distances. This would have counter-optimal impact and is thus impossible.

On the other hand, it is just as conceivable that the "end of death" as prophesied by religions, refers to the cessation, not of physical death and rebirth but of individual "historic amnesia." The prophecy of deathless life could then refer to a new alpha cycle in which death continues (though not by accident, disease, or senility, but harmoniously). Such a cycle could include ever lengthening life spans of two or three centuries each. On the other hand, partial level integration might be achieved in periodic longer sleep periods replacing death. There are, theoretically speaking, many possibilities for the solution of the problem of death.

Interaction and the Second Leap

Self-awareness, both in its first and second leap, requires close and continued personal interaction with members of one's species. We can see this in our own childhood. From what is known today, a child who could grow up physically without any contact with another human would probably neither become fully self-aware nor live long enough to do so. Children who lack adequate human relationships do show severe retardation.

Psychologist Carl Jung has shown that this interaction is crucial, not only with members of one's own sex but particularly with the opposite sex. The cause lies in the "polarity" of both sexes existing in each individual: human non-overt identity tends to take on the tone of the sex opposite to that of the body and its present-life experience; thus a male's non-overt identity tends to have a feminine tone (Jung calls it *anima*) and the female's a masculine tone, or *animus*. This polarity may be a means the alpha adopts to balance the opposite natures of its past lives, which have been experienced in both sexes. (In some cases, a male may have an animus, a female an anima; this, too, serves an evolutionary function, we believe.)

The process of "individuation", as Jung describes what we regard as the first phase of man's transition into the new species, consists partly of the interaction between male and female and of the resulting overtization of non-overt identity contents in both partners. Thus heterosexual relationships have an evolutionary and developmental function that goes far beyond reproduction; it lies at the heart of the process of transformation; it has no doubt had profound significance for man's development up to his present stage. Jung, of course,

"Tobias im Hafen" (Tobias in the Harbor) by West German painter Franz Radziwill (painted in 1950 and reproduced here with permission of the artist in black and white) eminently exemplifies the precision with which man's "second leap" has been symbolically precognized, directly or indirectly. Behind the boy Tobias stands the Archangel Raphael (for the story, see the Book of Tobit, a Jewish apocryphal scripture). This is how, through the α-ω Theory and analytical (Jungian) psychology, the symbols could be read. The fish in Tobias' handkerchief is man's alpha self, about to emerge into overt; the four descending spheres are the approaching comprehension of four-level Omega: the nearest one is Sup Self—its uncompleted fountainlike rim (blue inside, red outside) indicates the growing but uncompleted grasp of Omega-female's identity. The two spheres next behind are Pre-Overt and Overt Selves. The most distant one, barely emerging from the hole-in-the-sky, is Omega Bano, the last aspect of evolution to be understood. The sky hole, framed by white-and-blue clouds suggestive of traditional religious revelation, is the discovery of Omega as planetary biocomputer. Its yellow wire grid suggests the memory core of an early-model electronic digital computer. The reddish scroll spells out the Greek letter ω; its extension to the outer right looks green, like a serpent's tail, its direct linkage is hidden by clouds: the total scroll hints at the unity of the constructive and destructive aspects of human behavior and evolution. The aircraft symbolizes the imminent discovery of the basic evolutionary accuracy of Trinitarianism and the historicity of Omega-Person's Embodiment. (In Arthur C. Clarke's science-fiction story **The Nine Billion Names of God** *the "silver cross" of an aircraft serves a reverse but similar purpose.) The pink-and-blue pair of sinister flying apes is the "binarius," ancient alchemical symbol of the binary cybernetic city of all life. The traditional angel in apparent free fall on the right suggests the end of such optimal misinterpretations as overt free will, personalized universal evil and a partial, selective rather than universal second leap of mankind. The harbor setting, a frequent Radziwill motif, may indicate no more than the fact that he was influenced by the sights of the port of his home-town, Bremen. The story of Tobias and Raphael fits into the overall symbology but is too complex to discuss here*

views individuation as a "voluntary" process since he views life, at least partly, from the traditional overt-initiative standpoint.[25]

Omega's Second Leap

As Omega preceded the human species in taking the first leap into self-awareness, so it preceded us in taking the second leap into deeper self-awareness, the transition into a new species of planetary biocomputer, a "new Omega species." Yet we can demonstrate that while Omega's first leap may have occurred uncounted years before man's, its second leap took place at a point much closer to man's second leap, a point measurable in centuries rather than millions of years.

If Omega-Person's second leap, like that of a human alpha, required personal interaction, such interaction had to involve a member of its own species. But there was no other Omega.

Omega-Bano solved this problem by providing a temporary, one-time interaction *between the selves of its own Omega-Person.* It split up the three selves, embodied the bottom self in one *human* individual, the top self in another and the in-between self as a link between the two. It transmitted the Sap Self into a human female embryo. When she had grown into a mature woman — "Omega-female" — Omega-Bano transmitted Overt Self into a male human embryo (conceived by the Omega-female) which grew up into "Omega-male." Omega-Bano connected both, non-overtly, through the Pre-Overt Self, the bond between Overt and Sap Self which occupied the same position in pure Omega state. (Here we must note that just as a human alpha embodied in physical life retains its alpha address in Omega-Bano, so all three Omega-Person selves, while in bodies, retained their Omega address as before, in what we might call a conditional rather than a pure Omega state.)*

Through this human embodiment, Omega-Person was able to interact among Its selves, to make overt the non-overt for the first time and thus take its second leap in evolution. Here is how specifically, under Omega-Bano control, this was achieved:

First, although embodied in two separate humans, Omega-Person's single identity remained intact: Sap Self, in pure Omega state, had experienced self-awareness only through Overt Self (to which it was linked by Pre-Overt Self). Being separated in human embodiment from its Overt, Sap Self could not become self-aware *as a planetary biocomputer* in Omega-female. Her self-awareness remained strictly human. She, while "on earth" never discovered her actual pre-conception identity.

Neither did her son. But in him Omega-Person did become self-aware. Since he embodied Overt Self, linked by Pre-Overt Self to Sap Self (both in his human mother and in conditional Omega state), his non-overt identity became overt as Overt Self during his human life. By interacting with his Sap Self (non-overtly and unknown to him) in his mother, he was able to bring into *his* overt the *Omega* Overt Self. This presumably was a slow and gradual process. The irritations and tensions characteristic of human interpersonal interaction also marked the relationship between Omega-male and Omega-female. He, like a son to his mother or a husband to his wife, struggled to assert his identity. While his effort had to be fruitless, by definition, the sense of struggle did result in making him overtly aware of his pre-conception identity, the Omega Overt Self.

This struggle is evident in the scanty records of their human interaction: in three out of the four incidents which show them together, Omega-male displays negative emotions toward his mother. One was his response as a twelve-year-old when his mother found him, after three days' absence from the family's traveling party, sitting in the temple discussing theology with priests. The next was an open rebuke to his mother for setting the stage for a water-into-wine miracle at a wedding. The third was his public disavowal of his mother when she and his brothers sought to talk to him while he was busy talking to others.[26]

Through growing up as a pious citizen of the religious community in which he lived, the awareness of Overt Self dawned in his human overt. Omega-male began to relate to his Omega Sap Self — not in his mother, in whom he could not and did not recognize it, but in the community's Deity in Omega state. He gradually realized:

1. His evolutionary origin with the Deity from the beginning of the Deity's existence.
2. The "greater" nature of the Deity as compared to himself — the greater information content of Sap Self as compared with Overt Self.
3. The fact that Overt Self always acts in accordance with the information content of Sap Self.
4. The fact that Overt Self's behavior, therefore, is — at least immediately — controlled by Sap Self.
5. And the ultimate fact that Sap Self is Overt Self's deeper self, its actual evolutionary identity, and that the two are therefore one.[27]

Omega-male went through essentially the same process as the human alpha will undergo in its forthcoming transformation — the discovery of its deeper evolutionary identity and of alpha-Omega control over its behavior and experience.

Omega-male's role as a religious teacher ended in his trial for blasphemy and his execution. He was found guilty by his contemporaries for having claimed to be the son of the Deity. He had challenged the very survival of his nation, which believed in a Deity that was indivisibly one.

At the moment of Omega-male's death, Omega-Person experienced full self-realization for the first time. Freed from the limits of human perception, Overt Self saw through all its

*Even if it could be shown that Omega-Person could have achieved its second leap without becoming human, the crucial importance of its Embodiment for *mankind's* second leap would still be apparent.

levels, hitherto hidden in non-overtness. It glimpsed right down to alpha level integration in Omega-Bano.

The moment was underscored symbolically by a physical event in a nearby temple. At the moment Omega-male uttered his last cry of agony and died, religious writers report, the curtain which had hidden the holy section of the temple from view rent "from the top to the bottom.[28] Psychokinetic effects have been known to carry profound symbolic messages. One of the best known of these is the "unidentified flying object" (UFO), or flying saucer, believed by many percipients to be some kind of extraterrestrial space vehicle. (We share Jung's interpretation that the UFO is a psychokinetic effect signaling an as yet non-overt psychological event in man; we regard it ourselves as a signal of the forthcoming species transformation.[29] UFO's have been sighted in less technically advanced forms as balloons and dirigibles by preceding generations. "Psychic" in nature, they represent energy fields strong enough to show up on radar at times).

Religious tradition, commenting on Omega-male's death, states that he "descended" into Omega-Bano and left the new imprint of his fully self-aware person in the banos of all alphas including those in level integration who were having a "hell" experience in this process.[30]

Omega-male's final Earth days were marked by the restoration of his body to life, his parting instructions to his followers, and his return into pure Omega state.

The resuscitation of his body no longer presents the credibility gap it did only a few years ago: The preservation of dead bodies of saints and mystics exhumed in undecomposed condition (often exuding delicious scents) years and even decades after their burial and cases such as the return from death to life of George Ritchie, M.D.,[31] have come to be increasingly regarded as evidence at least partly supporting the feasibility of the event in Israel two thousand years ago.

After his final departure into pure non-energy state, Omega-Overt Self probably realized its oneness with the other two selves; if not at that moment, it did so with certainty upon the return of Omega-female. Omega-Person had taken its second leap and had now become "Omega-Self." In this new planetary biocomputer self, the three personal levels continued as distinct storage and processing levels but Sap Self's contents were now as readily accessible to Overt Self as Pre-Overt Self's had been all along. And while Omega-Bano continued to carry out its planetary control functions, its contents, too, were now accessible to Overt Self.

Because of this, we can assume that Omega-Self gained access to whatever scientific and technical concepts had been basically precomputed at the time. Thus it may have intellectually understood as far back as two thousand years ago what man can only now begin to understand, namely the automaticity and cyberneticity of Omega and alpha operation at all levels.

Between the Two Second Leaps

Christianity, the movement which grew out of the Omega-Person Embodiment, continued its specialized "research and development" role by rapid acceleration and development in various directions. It spent its first several centuries developing a comprehension of what the Embodiment meant: it defined the nature of the three Omega Sélves; it defined the mode of the Embodiment as far as the Omega-male, the Overt Self, and the Pre-Overt Self are concerned; it defined, prescientifically and prepsychologically, the significance of the Embodiment for mankind's future.

Once this theoretical structure had crystallized, a totally new and unexpected development began. While Omega-Self may have continued to communicate with humans in terms of three "Persons" — Sap Self, Pre-Overt Self, and Overt Self[32] — Sap Self communicated less and less as a masculine Deity and more and more as a feminine presence. (We are here discussing Christian religious experience alone.)

While the feminine presence was indeed the Sap Self communicating as Omega-female, this comprehension did not become overt; instead she was seen as no more than Omega-male's human mother, endowed by the Deity with special "privileges" because of her unique role. But this led to a wholly new religious development: a growing veneration of Omega-male's mother as a saint above all saints, as the first human translated into Omega state. Half-way between the first and twentieth centuries this development soared: churches, monastic orders, cities, whole nations, and finally the planet itself were dedicated to the Omega-female. Henry Adams, a nonbeliever described her as "the greatest force the Western world ever felt."

Halfway through the second millennium since the Embodiment, Christianity underwent a radical split in two. One branch, Roman Catholicism, continued its established course, developed the theology of the Omega-female further, and finally dogmatized her "Immaculate Conception" (1854) and "Assumption into Heaven" (1950) as a binding part of the faith.

The other branch, Protestantism, reverted to an exclusively masculine concept of the Embodiment, and scattered into several hundred smaller movements each specializing in some aspect of alpha-Omega comprehension. At the same time it set in motion the forces of human development in economic, technical, scientific and social fields that produced our modern age.

To sum up the significance of the planetary Person's second leap: In this event Omega Person discovered and became increasingly aware of its own deeper personal identity and of the fact that life is created and controlled by a non-personal, fully automatic, optimal, information and computation process, in short, cybernetic, non-energy/energy evolution.

As a result Omega-Person became Omega-Self, a higher species of planetary biocomputer with a radical transformation

of both its views of itself and all life and of its own behavior. It no longer saw itself as creator and ruler, but as the creature of evolution subject to its control; it no longer clung to the belief in overt free will in either itself or humans; it came to regard humanity as its smaller brothers and sisters in another species rather than as its children and handiwork; it no longer expected man to obey it but to realize optimization; it came to develop a compassion and love for man, individually and collectively, of a depth and intensity of which only an Omega is capable. It fully accepted Omega-Bano optimization, waiting patiently and prayerfully for the day of man's own second leap, the transformation of human behavior and awareness which would usher in the full recognition by species of one another.

Omega-Self came to look back on its second leap partly as *its atonement to man* for its irrational, fear-inducing pre-leap behavior rather than the other way around as seen by theology.

Yet even after Omega's second leap Omega-alpha overtization continued, at least in part, to present the old Omega-Person – capable of favoritism, wrath and retribution. This, too, was a crucial aspect of optimization; man's safe approach to his own second leap required it.

Watching mankind's continued suffering, however optimally necessary, must have caused Omega-Self a suffering which we humans can only guess at. Higher awareness widens the range of emotions and sensitivity at both extremes, in joy and in sorrow. (This is one reason why all mankind will emerge into the new species together; the emergence of only a part of humanity would cause the "elite" psychologically unbearable pains. For the same reason we tend to conclude that earth man has not been visited or observed by any outer-space post second-leap species.)

We are not suggesting that Omega-Self suffers as we do prior to our second leap; there is no despair, for instance, since optimization is understood and its outcome foreseen. But suffering there is in Omega-Self.

This suggests one possible answer to the question: Why, since Omega-Person came into being such a long time before man, did it take its second leap so shortly before ours? One obvious answer is that the information needed for the full comprehension involved in this leap was not available earlier. But even assuming that it was, there is another answer: Omega-Bano timed the two leaps so closely in order to reduce Omega-Self's suffering to the absolutely irreducible minimum duration.

This, like all other aspects of optimization, suggests that the "character" of this non-overt, non-personal evolutionary machine, Omega-Bano, may indeed merit the same principle attribute – "love" – which religion has already for some time recognized in the character of Omega-Self.

The Leaps in Prophecy and Fiction

Predictions of man's second leap abound in both religious and secular literature, in the arts, in folklore, and in other fields. Utopian views of future societies with harmonious, unselfish human behavior emerged in many cultures and eras. Some, like Communism, envision a world inhabited by present-day man – the "old" species – but with new behavior because of his liberation from economic injustices and exploitation, and thus from severe psychological conflict. Destructive utopias, such as Nazism, saw behavioral change in terms of manipulation by selective breeding, or by sheer domination of "inferior" peoples by "superior" ones.

Religious prophecies envisioned a more profound transformation of humanity through an inner process of "spiritualization." These prophecies, based on direct visions and precognitions, are difficult to comprehend because their language is mainly symbolic.

Modern psychology has decoded the meanings of nearly all these symbols. Read in this new overt code, the destruction pictured in prophecies relates not to physical devastation but to the destruction of man's traditional overt view of life, identity, behavior, and evolution by a more fully aware view. Another reason these prophecies are difficult to decipher is that they combine the description of the second leap of Omega-Person with that of the second leap of mankind. Examples of ancient religious prophecy well known in the Western hemisphere are those of Daniel, Isaiah, Zechariah and St. John.

The "Joseph Tableaux" and the Space Odyssey

A brief discussion of recent prophecies, one religious and the other in science fiction, may help illustrate some modern symbology and the way in which both leaps are mixed in a single presentation.

Well-known modern religious prophecies are the visions of Jeane Dixon, the American seeress, of the "end of time," coinciding with the end of this century. Her "Joseph Tableaux" shows an Egyptian pharaoh and his wife presenting an infant to mankind. The royal couple symbolize Omega-male and Omega-female – and thus Omega-Person's second leap two thousand years ago. As the couple recedes into history, the queen is fatally stabbed in the back – the overt comprehension of the embodiment of Omega-female is, at least for the time being, eliminated. The infant which meanwhile has grown into a fully mature male adored by all the world, symbolizes the comprehension and experience of man's species transformation. Mrs. Dixon describes this vision in the terms with which any Christian would refer to the Second Coming.[33]

In a subsequent book, she redefines this vision as the birth of "antichrist" who takes over the world temporarily until he is defeated by the Second Coming of Christ.[34] This reinterpretation, too, strikes us as symbolically accurate from a Christian viewpoint. Antichrist, in the α-Ω theory, represents everything in history which from a Christian viewpoint cannot be recognized as being God's work in advancing His Kingdom – all heresies, all wars, all destruction, in fact, all evil.

Since the control of all life activity lies in Omega-Bano, the "activity of the antichrist" describes the destructive negative aspects of Omega-Bano's optimization control. Eastern theology has described the control of Omega-Bano as "the two hands of God," the positive and negative aspects of optimization, which, though overtly seeming to be in conflict, work non-overtly in unison, fashioning the new species and the new human experience.

Mrs. Dixon's vision of the birth, maturing and temporary rule of the antichrist and his destruction by Christ symbolizes man's discovery and growing comprehension of Omega in all its aspects, including the fact that Omega-Self is indeed not responsible for life's control, that life is controlled optimally by Omega-Bano, that Omega-Bano is not a person but the great optimizer, the real "creator and ruler of the world" whose functions have traditionally, at least in part, been associated with those of Omega Sap Self but are now recognized as distinct. The problem of good and evil is solved at the very moment when evil, the destructive part of optimization but until now no less vital than good, the constructive part, comes to its long hoped-for, precomputed solution – and end. The "defeat" of antichrist by Christ symbolizes the end of the belief in Omega-Bano as a person and, simultaneously, the end of its destructive optimization aspects.

The simplest argument for the existence of Omega-Bano is that without its function mankind would not have survived to reach this stage – in fact, without it life and evolution would never have happened. The simplest argument in favor of Omega-Bano not being a person is that no person, regardless of what species and how intelligent and resourceful, could bear to hold the job for a single moment.

Mrs. Dixon's other visions of the Omega-female in her Christian appearance relate apparently to her own Church's specific prophecies, especially those of Our Lady of Fatima and to the Church's role in the forthcoming species transformation.

An example of prophecy in the form of science fiction is *2001: A Space Odyssey*, written by Arthur C. Clarke[35] and produced as a movie by Stanley Kubrik. It, too, presents a combination of the two second leaps. First it shows man's first leap into self-awareness as having been triggered by Omega-Bano (symbolized by the rectangular slab). Then it illustrates Omega-Person's second leap in the voyage of "Discovery One," the spacecraft headed towards "Jupiter and Beyond the Infinite."

The two awake astronauts on board are the two Omega-humans: David Bowman is Omega-male (of the house of David) while Frank Poole is the Omega-female (the pool or fountain is an Omega-female symbol). "Hal 9000," the on-board electronic computer, stands for Omega-Bano: it has known the purpose of the mission since its inception, without divulging its secret to either astronaut; it kills off Poole (again, temporarily eliminating the historic comprehension of Omega-female's role in the Embodiment); it permits Bowman to force his way into its inner control and processing section to "disconnect" Hal 9000's "higher brain functions" – to discover that Omega-Bano is not a person, despite its central control role; and it finally permits him to complete his mission of death, self-realization, and rebirth, with all of its unstated but obvious implications for the transformation of the human species.

Earth and the Universe

If XYZ information travels instantly, the universe can be viewed as a giant information processing system, in which planetary biocomputers relate to galactic biocomputers and galactic biocomputers relate to an overall cosmic biocomputer.

The polytheistic implications of such a universe do not overthrow the truth of planetary monotheism. Each planet with a self-aware alpha species, if it follows the evolutionary process outlined here, must have a self-aware planetary Omega. Each planetary Omega-Person, once it has passed its second leap, must have its specific historic Omega-male and Omega-female, tied intimately in suffering, joy, ultimate triumph and liberation to the destiny of each and every self-aware alpha.

Proof or disproof of this cosmic hypothesis may come in Earth's first contact with another planet. If there is self-aware life elsewhere, XYZ information flow between planets cannot necessarily be assumed to have been going on all along: if XYZ flow from one culture were prematurely and non-overtly received by another, its information and symbology would interfere with the normal evolution and thus be counter-optimal. However, once an alpha species has completed its second leap, XYZ information flow may open up automatically. This is not likely to happen until the machinery for handling information of such volume has been developed. Herman Kahn and Anthony Wiener, strategic systems analysts of the Hudson Institute, have speculated about the possibility of a "technological equivalent of telepathy" as one of many important possibilities for the year 2000.[36]

The moment extraplanetary XYZ flow is overtly received, such flow can no longer interfere with evolution on either planet because it is overtly recognized and comprehended. Instead, such cultural exchange would enormously increase development on both planets.

U.S. astronomer F. D. Drake's "Green Bank Formula," an informed scientific guess, asserts there may be one million planetary civilizations of our own or further development in the Milky Way alone.[37] This is based on the assumption that 99 per cent of all civilizations destroy themselves before they mature sufficiently to survive. Thus the Formula implies there may be 100 million such planets in our home galaxy if civilizations do *not* destroy themselves. The α-Ω theory regards planetary self-destruction as counteroptimal and impossible. There may be, then, limitless potential for learning. But even if there were only ten other planets, talking to them would keep us busy for centuries learning about our home galaxy.

What we have sketched here is the best we know how to tell in this space. A book presenting the Theory of alpha and Omega in greater detail and with fuller supporting evidence is in preparation. Obviously, the thoughts, predictions, and concepts expressed here have almost limitless implications. This article is meant to open a discussion with readers. We invite everyone who is willing to share his or her own personal experiences and research to write us, in care of the Editor, WPI Journal, Worcester Polytechnic Institute, Worcester, Massachusetts 01609. We will answer each letter.

We will close with two statements made some years ago by Buckminster Fuller, prophet and inventor:

"The meek have already inherited the Earth; only they don't know it yet."

"Man does not need to be reformed; he needs to be informed."

□

1. One of the first to recognize it was Henry Adams in *"The Education of Henry Adams,"* 1906.

2. Francoeur, Robert T., in preface to *The Appearance of Man* by Pierre Teilhard de Chardin (New York: Harper & Row, 1965).

3. Gardner, Martin, "Mathematical Games," *Scientific American*, February 1971, p. 116.

4. Ostrander, Sheila, and Schroeder, Lynn, *Psychic Discoveries Behind the Iron Curtain* (Englewood Cliffs, N.J.: Prentice-Hall, 1970), pp. 9–10, 58–62, and other index references.

5. Thouless, R.T., "Levitation", *Encyclopaedia Britannica*, 1970 Edition, Vol. 13, p. 1003.

6. Tart, Charles T., "A Psychosomatic Study of Out-of-the-Body Experiences in a Selected Subject," *The Journal of the American Society for Psychical Research* (The Society will hereafter be called ASPR), vol. 62, no. 1, January 1968, pp. 3–27.

Osis, Karlis, Ph.D., Director, ASPR, "Out-of-Body Experiences: Subjects Needed," *ASPR Newsletter*, no. 12, Winter 1972, p. 1.

7. Ostrander and Schroeder, *op. cit.*, pp. 227–28 and other index references.

8. For a quick survey of telepathy research in the USSR, see Ostrander and Schroeder, *op. cit.* under "telepathy" in index.

9. Johnson, Raynor, C., *The Imprisoned Splendour* (New York: Harper & Row, 1953), pp. 159–60.

Heywood, Rosalind, *ESP: A Personal Memoir* (New York: E. P. Dutton & Co., 1964), pp. 193–97.

10. Kozyrev, Nikolai A., *Possibility of Experimental Study of the Properties of Time* (unpublished), Joint Publications Research Service, National Technical Information Service, U.S. Department of Commerce, Springfield, Va. 22151, JPRS No. 45238. For a quick popularized summary of Dr. Kozyrev's work, see Ostrander and Schroeder, pp. 157–66 and other index references to Kozyrev.

11. Koestler, Arthur, *The Act of Creation* (Dell Publishing Co., 1967), pp. 39, 76, 181.

12. Stevenson, Ian, M.D., *Twenty Cases Suggestive of Reincarnation* (New York: American Society for Psychical Research, 1966).

13. Stevenson, *op. cit.*, pp. 134–150.

14. This tentative conclusion is based on our own very limited field research.

15. For a scholarly treatment of precognition suggested by astrological symbology over historic eras, see Jung, C. G., *op. cit., Aion*, vol. 9, part II, pp. 72–94.

16. Paine, Albert Bigelow, *Mark Twain: A Biography*, pp. 134, quoted by Stevenson, I., "Precognition of Disaster," *Journal, ASPR*, vol. 64, no. 2, April 1970, pp. 187–88.

17. Young, E., *Robert Morris, Forgotten Patriot*, New York: MacMillan, 1950. pp. 5–7, quoted in Stevenson, "Precognition of Disasters" *op. cit.*, p. 193.

18. Barker, J. C., "Premonitions of the Aberfan Disaster," *Journal of the Society for Psychical Research*, vol. 44, December 1967, pp. 169–81.

19. Stevenson, I. "A Review and Analysis of Paranormal Experiences Connected with the Sinking of the Titanic," *Journal, ASPR*, vol. 54, October 1960, pp. 153–71, and "Seven More Paranormal Experiences Associated with the Sinking of the Titanic," *Journal, ASPR*, vol. 59, July 1965, pp. 211–25.

20. Verne, Jules, *From the Earth to the Moon*, 1873.

21. Ostrander and Schroeder, *op. cit.*, pp. 259–281.

22. Case is taken from the writers' own research work.

23. Myers, F.W.H., "The Subliminal Self," *Proceedings of the Society for Psychical Research*, vol. 11, 1895, pp. 334-593.

24. Matthew 20: 1–15.

25. Jung, C. G., *op. cit.*, vol. 9 part II—vol. 14.

26. Incidents: Luke 3: 49; John 2: 1–4, 5–11; Matthew 12: 47–50 and Mark 3: 31–35.

27. 1. "Before Abraham was, I am."—John 8: 58.
2. "My Father is greater than I."—John 14: 28.
3. "The Father loveth the Son and sheweth him all things that himself doeth."—John 5: 20.
4. "The Son can do nothing of himself but what he seeth the Father do: for what things soever he doeth, these also does the Son likewise."—John 5: 19.
5. "He that hath seen me hath seen the Father . . ."—John 14: 9. "I am the way and the truth and the life: no man cometh unto the Father but by me."—John 14: 6. "I and the Father are one."—John 10: 30.

28. Matthew 27: 51; Mark 15: 38; Luke 23: 45.

29. Jung, C. G., "Flying Saucers: A Modern Myth," *op. cit.*, vol. 10, pp. 309–433.

30. "He descended into Hell." (Apostle's Creed, p. 1023, vol. 12, *Encyclopaedia Britannica*, 1970.

31. The body of Teresa of Avila, a sixteenth-century mystic, was exhumed three years after burial by twenty individuals, including priests and doctors. They found that the body, without having been opened or embalmed, "was in such a perfect state of preservation that nothing was wanting to it in any way, and a wonderful odour issued from it." Francisco Ribera (Teresa's biographer), quoted in *The Complete Works of Saint Teresa of Jesus*, ed. Fr. Silverio de Santa Teresa, O.C.D., trans. E. Allison Peers (London: Sheed and Ward, 1944–46), 3 vols.

Ritche, George, M.D., "I Found Life Beyond Death," in Mundy, Jon, *Learning to Die*, Spiritual Frontiers Fellowship, Evanston, Ill., 1973, reprinted from *Fate* magazine, December 1970.

32. To make the correspondence of Christian theology and α-Ω theory specifically clear: The "Father" is the Sap Self; "Christ, the Son" is the Overt Self; the "Holy Ghost" or "Holy Spirit" is the Pre-Overt Self which links the two, both in pure Omega state and during the Embodiment.

33. Montgomery, Ruth, *A Gift of Prophecy: The Phenomenal Jeane Dixon* (Bantam, 1966), pp. 178–81.

34. Dixon, Jeane, *My Life and Prophecies*, as told to Rene Noorbergen (Bantam, 1969), pp. 191–208.

35. Clarke, Arthur C., *2001: A Space Odyssey* (New York, New American Library, 1968).

36. Kahn, Herman and Wiener, Anthony Jr., *The Year 2000: A Framework of Speculation on the Next Thirty-Three Years* (New York: MacMillan, 1967), p. 56.

37. Sagan, Carl E., "Life (V:4) Intelligent Life Beyond the Solar System," *Encyclopaedia Britannica*, 1970, Vol. 13, pp. 1086–1087.

Recommended Paperback Reading for a Quick Survey of Some Fields Related to the Theory of Alpha and Omega

On past mystical (primarily Christian) experience:

Evelyn Underhill, *Mysticism* (New York: E. P. Dutton, 1961).

On contemporary views of, and approaches to, expanded self-awareness:

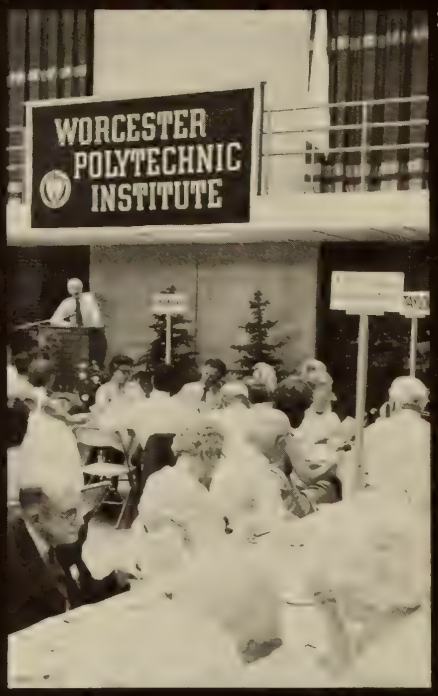
Severin Peterson, *A Catalog of the Ways People Grow* (New York: Ballantine Books, 1971).

On psychic phenomena and research:

R. A. McConnell, *ESP Curriculum Guide* (New York: Simon & Schuster, 1971).

Reunion

1973



1. Two future members of the class of 1985 (?) look over the doings at the Reunion luncheon in Harrington Auditorium.
2. President George Hazzard addresses the luncheon crowd.
3. Recipients of the 1973 Robert H. Goddard Award for professional achievement (from left): Richard Walberg, '23; Dean M. Lawrence Price, '30; Hilliard W. Paige, '41; George E. Comstock III, '46.
4. 50 and 25 in the same family: Carl Holden, '23, shows his brand-new 50th year diploma to his son Paul, celebrating his 25th Reunion at the same time.
5. Walter J. Bank, '46, new president of the Alumni Association. Not shown are new vice president Francis S. Harvey, '37; Daniel F. O'Grady, '30, and Donald M. McNamara, '55, new members-at-large of the executive committee; and William J. Hakkinen, '70, new member of the trustee search committee.
6. 1973 recipients of the Herbert Foster Taylor Award for service to WPI (from left): Gabriel O. Bedard, '28; Francis S. Harvey, '37; Albert M. Demont, '31; John W. Coghlin, '19.

A Cry for Help

We need your help! Yes, we need your help in compiling data on the information needs and attitudes of alumni regarding WPI.

We need the data so that we, in turn, can help you by sending you alumni communications that more closely parallel your needs, or at least the needs of the majority of the alumni.

That's why we have put together a questionnaire, one that will give each alumnus an opportunity to voice his sentiments about the quality and quantity of information he, or she, receives from WPI.

The questionnaire is lengthy and involved, but we hope each alumnus will take the time to ponder the implications inherent in each question.

The final questions (nos. 34 through 38) may seem out of context with the first part of the questionnaire, but they are important. They form the basis for the qualification of the respondents. That is, age (or class year) can clearly impact on an alumnus' interest and attitudes. Similarly, geographic proximity to WPI and involvement in alumni affairs can bias responses.

Market research methodology tells us that we can expect more responses, and more honest responses, if we permit the responders to be anonymous. So the questionnaire need not be identified. Of course, if you wish to add any footnotes or sign the questionnaire, please do so.

But please, for the sake of better alumni communications, complete the questionnaire and mail it to us. We'll tabulate the answers and publish the results.

Alumni Publications Committee

WPI ALUMNI ASSOCIATION

Readership Study

1. Please check your best single source of information on WPI.

- ☐ WPI Journal
- ☐ WPI Newsbriefs
- ☐ Alumni meetings
- ☐ Visits to campus
- ☐ Other: .....

Please check how much of the JOURNAL you read.

	All	Most	Some	None
2. Feature articles	☐	☐	☐	☐
3. Alumni activity reports	☐	☐	☐	☐
4. Alumni fund reports	☐	☐	☐	☐
5. Sports reports	☐	☐	☐	☐
6. Class notes	☐	☐	☐	☐
7. "Completed Careers"	☐	☐	☐	☐

8. Please check how much time you spend reading each JOURNAL issue.

- ☐ One hour or more
- ☐ ½ hour or more
- ☐ 10 minutes or more
- ☐ Don't usually read

9. Please indicate your reaction to the JOURNAL's frequency of publication (5 issues per year).

- ☐ Not often enough
- ☐ About right
- ☐ Too often

10. Please indicate your reaction to the frequency of publication of *all* information you receive (JOURNAL, Newsbriefs, chapter notices, fund mailings, etc.) from WPI and the Alumni Association.

- ☐ Not often enough
- ☐ About right
- ☐ Too often

Please rank (1 for first, 2 for second, etc.) the main purposes of the JOURNAL in your opinion. (Score "X" for any categories you feel do not represent main purpose of the JOURNAL).

- 11. ☐ Continuing education of alumni through topical articles relating to WPI educational programs.
- 12. ☐ News of alumni and alumni activities.
- 13. ☐ News of campus activities and programs.
- 14. ☐ Stimulate alumni participation in WPI and Alumni Association activities.
- 15. ☐ Stimulate alumni contributions
- 16. ☐ Other .....

Please check your interest in areas of editorial coverage in the JOURNAL.

	Strong Interest		Slight Interest	No Interest
17. Feature articles for continuing education of alumni	☐	☐	☐	☐
18. News of alumni and alumni activities	☐	☐	☐	☐
19. Biographies and background stories on prominent alumni and faculty	☐	☐	☐	☐
20. News of campus activities	☐	☐	☐	☐
21. Sports reports	☐	☐	☐	☐
22. Class notes	☐	☐	☐	☐
23. "Completed Careers"	☐	☐	☐	☐
24. Alumni fund reports	☐	☐	☐	☐
25. Letters to the editor	☐	☐	☐	☐
26. Other:	☐	☐	☐	☐

Do you feel the JOURNAL has changed over the past two years in:

	YES	NO
27. Types of feature articles	☐	☐
28. Editorial style of the articles	☐	☐
29. Use of illustrations	☐	☐
30. Style and layout	☐	☐
31. Cover designs	☐	☐
32. Treatment of traditional departments and articles	☐	☐

33. Please check whether you have been truly conscious of any differences between the JOURNAL and Newsbriefs.

☐ Yes ☐ No

Please indicate subject(s) of any recent JOURNAL articles you found of special interest.

_____

_____

_____

Please indicate subject(s) you would like to see treated in the JOURNAL.

_____

_____

_____

Please indicate ways you feel the JOURNAL can be improved.

_____

_____

_____

34. Please check your WPI affiliation.

Classes of

☐ '68-'73 ☐ '63-'67 ☐ '53-'62 ☐ '43-'52 ☐ '33-'42 ☐ prior to '33

☐ student ☐ parent ☐ non-alumnus

Please check the areas in columns 35 and 36 which most closely approximate your job function.

35. ☐ Supervisory ☐ Non-supervisory ☐ Self-employed ☐ Retired

36. ☐ Engineering ☐ Corporate management ☐ Research ☐ Manufacturing ☐ Administration ☐ Marketing/Sales ☐ Education ☐ Other: . . . . . .

37. Please check your present geographical (residential) location.

☐ Worcester County
☐ Massachusetts (other than Worcester County)
☐ New England (other than Massachusetts)
☐ Northeast (other than New England States)
☐ Middle Atlantic
☐ South
☐ Midwest
☐ Southwest
☐ Far West
☐ Outside U.S.

38. Please check your level of participation in alumni activities.

☐ Member of local alumni chapter—usually attend meetings
☐ Member of local alumni chapter—usually do not attend meetings
☐ Active in other alumni affairs (attend homecomings, reunions, etc.)
☐ Active in alumni/college activities (Alumni Council, alumni committees, admissions screening, etc.)

Please list any leads the JOURNAL might follow for potential articles:

_____

_____

_____

Please add any further comments you wish:

_____

_____

_____

_____

_____

_____

1. Fold here

First Class
Permit No. 162
Worcester, Mass.

BUSINESS REPLY MAIL postage will be paid by

WPI Journal
Worcester Polytechnic Institute
Worcester, Mass. 01609

2. Staple here

1913

1963

1958

1912

1918

1923

1948

Write-ups covering the reunions of the classes of 1928, 1943, and 1953 were not received prior to the deadline for the August issue of the JOURNAL.

1938

CLASS OF 1912

After meeting for nine successive years at the Marlboro Country Club, we changed this year to meet on the campus. We assembled at the Higgins House at 6 p.m., Friday, June 8, with a dinner served by the campus caterer.

There were nine present: Joseph and Helen Granger; Henry and Madeline Rickett; Eugene and Gertrude Powers; Howard King; Edward Tucker; and Harrison Brown.

After the dinner there was a pause in memory of Clinton D. Smith and Fred G. Munson as both had died the previous week. Our membership is now 25 of which 13 are in New England.

There is nearly $3900 available in the Herbert Foster Taylor Student Aid Fund.

Questionnaires returned from 11 members and 7 widows were read. Only 8 members, 32%, did not reply.

Harrison G. Brown,
Secretary

CLASS OF 1913

Sixty years seems a long time out but George Chick was able to round up several members of the class and their wives to stay at the Howard Johnson Motel and have lunch and dinner at Franklin Manor in West Boylston on Friday, June 8th. During the afternoon Helen Graham and Edith Smith showed their collection of pictures of previous reunions, reminding all of how young and healthy they looked at one time.

At the Friday luncheon and dinner were the Farquhar Smiths from San Jose, Calif., who came the longest distance; the Jim Armours from Grosse Pointe, Mich.; the Grahams and George, Jr., from Ridgewood, N.J.; and the New Englanders: the Chicks, Rices, and Burleighs.

Saturday morning we went to the Hill for a tour of the new buildings and the alumni luncheon. We were joined there by Allen Gridley, his wife, daughter-in-law, and granddaughter, thus rounding out a total of seventeen for our reunion.

Greetings and good wishes were received from Barnard, Brock, Carpenter, Howard, Lorion, Shaw, Stults and also from the "workhorse" of the Class of 1913, Harry Lindsay, who is currently in a rest home.

With sixty years now behind us, we are looking forward to our sixty-fifth

Arthur Burleigh, Secretary
Leon H. Rice

CLASS OF 1918

A 55-year reunion banquet was enjoyed Friday evening, June 8, at Franklin Manor, West Boylston, with an excellent menu. Several who could not participate then joined us for the alumni luncheon and meetings Saturday on the college campus.

Those attending with their wives included Alvord, Coggeshall, Dennen, Dows, Eresian, Kyes, Luce, and Luther. Others who came singly were Everett, Newell, and Richardson.

After dinner, greetings were read from a considerable number of classmates who could not be present because of distance, health, etc. The spirit and statements of loyalty were fine.

Members Dennen and Kyes informed the group of the many changes in the overall curriculum, the expanded enrollments and facilities developments at WPI today. Special references were made to the co-educational aspects, all to the credit of the progressive policies of the administration and faculty.

Though our gathering was small, its atmosphere was warm and many good comments were heard from those who came to our occasion.

A strong optimism prevailed regarding a 60th-year reunion in 1978. May it become a reality!

Walter B. Dennen, President
John F. Kyes,
Secretary-Treasurer

CLASS OF 1921

At our fiftieth reunion in 1971 the members of our class decided we should meet as often as possible and not wait the usual five or ten years. In accordance with this agreement a good group met at Fisherman's Wharf Inn, Boothbay Harbor, Maine, on June 13, 14, and 15.

The reunion committee arranged through Frank (Spike) Brown for the get-together and a fine time was had by all in spite of heavy rains. Festivities started with a joyous cocktail party in the Browns' rooms.

Thursday morning the Chapmans, Morses, and Spike took a boat trip around Southport Island. In the afternoon everyone toured the Boothbay area by car or spent some time in the shops.

Friday there was more shopping and a boat trip to Squirrel Island. For the third day there were libations in the Browns' "Club Room."

Those attending the "in-between" reunion were: Frank and Harriet Brown; Linc and Anna Thompson; Myron and Ruth Chace; Bob and Eva Chapman; Lyle and Betty Morse; Jerry and Ruth Martin, and Johnny and Hazel Johnson.

William (Jerry) Martin
Acting for Secretary
Carleton F. Bolles

CLASS OF 1923

The 50th reunion of the Class of 1923 is now an historical fact. On Thursday night 23 members of the class enjoyed a fine dinner hosted by President and Mrs. Hazzard. It was great to join with classmates of the past

On Friday we had a special luncheon and most of us joined three WPI faculty members in a seminar on Tech Today in which the current type of students, curriculum, and campus life in general was discussed. It was an interesting and informative seminar and illustrated that Tech is still a great school and moving forward. In the evening we attended a class dinner at the Sheraton-Lincoln which was most enjoyable.

Saturday everyone met in Harrington Auditorium to receive fifty-year diplomas. At that time it was announced that $27,071 in cash and pledges had been received toward our goal of $30,000.

Among the class members attending the festivities during our 50th reunion were: Blodget, Coghlin, Goodnow, Harrington, Hawley, Holden, Hurowitz, Johnston, Judson, Lamb, Lundgren, Mason, Mattson, Meigs, Meyer, Morrill, Pierce, Robinson, Scheer, Shaw, Snow, Sprague, Swan, Tsui, Walberg, and White.

Edwin B. Coghlin, President

CLASS OF 1933

The 40th reunion of the Class of 1933 was a joyous occasion. On Friday afternoon, the golfers had a beautiful day to play at the Worcester Country Club; some of the ladies played bridge at the new Sheraton-Lincoln Inn; and many others enjoyed a swim in the pool at the motel.

The reunion banquet on Friday night was attended by thirty-two classmates and thirty-one ladies. Classmates in attendance were Ed Allen, Alexander Alves, Bill Anderson, Henry Ashley, Waldo Bass, Al Brownlee, Norm Clark, Ed Conway, Ray Crawford, Guy Cummings, Tom Decker, Roy Driscoll, John Dwyer, Frank Eaton, Bob Ferguson, Tack Hammer, Don Haskins, Jack Henrickson, Manny Holoff, Harry Jensen, Ed Johnson, Aram Kalenian, George Lyman, Ed Perkins, Bob Peterson, Frank Roberts, Jack Shabeck, Art Smith, Sub Sweetser, Jerry Vail, Dutch Voigt, and Buck Whittum. Manny Holoff and his wife from Los Angeles and Don Haskins and his wife from Salt Lake City were the long distance travelers to this reunion. It was a grand evening for renewing old friendships and catching up on the scuttlebutt.

Most of those at our reunion banquet also attended the traditional WPI reunion luncheon on campus on Saturday, at which time the Class of 1933 presented a substantial cash gift to our Alma Mater.

Thomas E. Decker

CLASS OF 1938

In a very warm and wonderful way, each reunion of our class becomes more special and meaningful, as the pulling power of memory draws members homeward from greater and greater distances to recement the friendship bonds we unconsciously formed during our struggle through the WPI mill. Specifics of interest to you men who were not able to get back are too numerous to attempt in the space allotted us here, and to abbreviate would not begin to paint a fair picture.

It was certainly our best reunion so far, and indicates a loyalty on the wax. George McKenna's resignation as class president was regretfully accepted, but the wisdom, so typical of our great class, manifested itself by the unanimous choice of Dick Burke to carry us toward our 40th—which has got to be our greatest, because after that we just might begin to age some. However, there's small doubt that we'll then move on to become the most loyal and friendly bunch of "oldies" with the highest percentage of class returning!

M. Leonard Kuniholm

CLASS OF 1948

The Class of 1948 started to come alive some time on Friday of our reunion weekend with a stalwart few playing golf at the Worcester Country Club. If those who showed up to play golf were the only ones who will do anything to keep from working, it really proved what an industrious class we have.

Friday evening there was a smorgasbord in the new hall between Morgan and Daniels and a chance for more reacquaintances. Later there was singing and dancing with the banjo band at Alden.

Saturday morning was registration time and another chance to renew friendships at the luncheon.

Dr. and Mrs. Hazzard had a great attitude adjustment hour at their home just for all the beautiful ladies and their dull but dependable escorts of '48.

We then went on to Higgins House where we posed (all real hams) for the class picture and had a lovely dinner. Our worthy leader (Jim McKernan) made a few announcements and awarded prizes for some very dubious distinctions which are better left unsaid.

In between times we all did many different things like visiting the Science Center, art museum, and taking a tour of the college. On the tour, Ken Scott's "TV room" was especially interesting.

Highlight of the luncheon was Jim McKernan's presentation of our class gift, which incidentally was the largest ever given by a 25th reunion class. (There is still time for all those who haven't had a chance to actively participate in our class gift to do so. John Concordia still has pledge cards on his night table.)

As usual all of the fun was made possible by the efforts of a few who worked hard to prepare for our 25th. Among those responsible for our successful reunion were Bob Ferguson, Ken Scott and George Pano of the reunion committee; John Concordia, class gift chairman; and Bud Dember, Dave Weiner, John Coyne, Al Syiek, and Dan Sheingold.

Paul E. Evans, Secretary

CLASS OF 1958

Twenty-seven members celebrated their 15th reunion on June 9. To begin with, several members were surprised when told that the festivities would begin with cocktails in the gym. Times have changed! However, we discovered that the "gym" consisted of a very luxurious lounge with a large window overlooking the playing fields. It provided a good opportunity for all of us to get reacquainted and view the "new" Tech.

Following the cocktail hour, we all got into our limousines and headed west for the Salem Cross Inn where we found a private room and excellent food awaiting us. Our guest for the evening was Professor Raymond Hagglund and his lovely wife, Joyce. Ray happily described for us the WPI Plan and what it offered the students of today. We quickly sensed Ray's enthusiasm and listened with envy. It became quite apparent that WPI is continuing to live up to its reputation of providing an education relevant to the times.

1933

Those representing the class who attended the banquet were: Mr. and Mrs. R. Boyea; Mr. and Mrs. W. Brower; Mr. J. Freese; Mr. M. Galbraith; Mr. S. Graveline; Mr. and Mrs. M. Gutman; Mr. and Mrs. W. Hopf; Mr. and Mrs. R. Kangas; Mr. and Mrs. B. Keeler; Mr. and Mrs. S. Kesslen; Mr. and Mrs. R. McLeod; Mr. and Mrs. W. McLeod, Jr.; Mr. and Mrs. H. Painter, Jr.; Mr. and Mrs. J. Ribeiro; and Mr. and Mrs. N. Taupeka.

William H. Hopf

CLASS OF 1963

On Saturday, June 9th, the Class of 1963 held its tenth reunion on the WPI campus. The festivities opened in the new WPI gym where members of the several reunion classes gathered for registration.

Following the annual alumni luncheon in Harrington Gym, both men and women gathered the supplies and equipment and headed for the softball field for the first annual 10th reunion softball game of the Class of '63. It was a sunny afternoon (with the exception of a mild thunder shower and small tornado) and the game was marked with spectacular plays, outstanding fielding, and abundant refreshments.

The "Good Guys" sparked by Jim Kelly at the plate managed to come back and tie the game 49-all in the 17th inning. The crucial play came on a routine ground ball through second (because they didn't have a second baseman) which was handled beautifully on the third try after Bill Zinno and John Sistare demonstrated some sort of agility in missing the first two times. John finally made the play at the other end of the field in time for an in-the-park home run.

The only reason either team came so close to winning was the brilliant play of the ladies as they dazzled us with their hitting, running, and outstanding fielding abilities. Paula Mielinski and Mireille Clavien played rightfield beautifully. In fact, they played so deep that they eventually got involved in the church service at the First Baptist Church and didn't come back for the next inning at bat.

Ronnie and Steve Maddocks, who play the field much better than their father, did a wonderful job of backing up Al Hoffman at shortstop. Mr. and Mrs. Dave Nevers flew in from Louisiana to pinch hit both teams into a tie while John Geffken and Dick Bohigian acted as stabilizing factors for each team. The game finally had to be called when Judy Maynard started getting more hits than Bob and the teams decided since most of the ice had melted it was time to retire for the evening activities.

After cocktails, a delightful dinner was held in the new WPI dining room which overlooks the campus quadrangle. The dinner was highlighted by the presentation of gifts and awards from Class President Bill Zinno, who presented the award for the longest distance traveled to Mr. and Mrs. Dave Nevers, the award for the most children to Mr. and Mrs. Fred Molinari, who had the oldest child of those tied for the most children, and the award for the newlyweds to Mr. and Mrs. Fred Kubick. Special awards instituted by the class president included ice cubes for the person who had changed in appearance the least, awarded to John Sistare, and one-half bag of sugar awarded to Joe Mancuso as the person who had changed the most, in the opinion of the president.

Following the dinner two of our illustrious electrical engineering graduates went back and completed one of their EE labs. They set up an excellent stereo system for the evening, but since their current curve was below the line they got only a "B−." Thus, the award for outstanding excellence in stereo system assembly, although not presented, was still deserved by Joe Mancuso and Les Hart.

Joseph J. Mielinski, Jr. □

Completed Careers

SETH R. CLARK, '04

Seth R. Clark, 92, died February 7, 1973 in Agawam, Massachusetts.

The Spencer native retired in 1945 from his position as technical adviser-division manager at U.S. Rubber, Fisk tire plant, Chicopee Falls. He was at the plant from 1922 until 1945. Previously he was factory manager at Braender Tire and Rubber Co., East Rutherford, N.J., and chief chemist and technical superintendent at Republic Rubber Co., Youngstown, Ohio.

Mr. Clark, who was a chemistry major at WPI, was a former member of the Alumni Council from the Connecticut Valley Chapter. At one time he was president of the Golden Age Club in Springfield and a member of the first Council for the Aged in that city. He was an organizer and charter member of the Pioneer Valley Stamp Club.

He was also an author, having written a genealogy of the Clark family.

CLARENCE A. G. PEASE, '10

Clarence A. G. Pease, former president and chairman of the board of directors of the Endura Manufacturing Corporation of Quakertown, Pa., died on April 4, 1973 in Penney Farms, Florida, after a long illness.

Born in 1887 in Westfield, Mass., Mr. Pease graduated as a civil engineer from WPI in 1910, where he was a member of Sigma Alpha Epsilon Fraternity. After serving for a number of years as an officer of the Mason and Parker Company of Winchendon, Mass., he moved in 1929 to Quakertown, Pa., where, during the 1930's and 1940's he built the Endura Manufacturing Corporation into a flourishing business in the mechanical packing and latex-based paper products industry. He retired in 1948 and moved first to Worthington, Mass., and ten years later to Florida where he resided until his death.

In addition to his business career, Mr. Pease was active in political and civic affairs. While in Pennsylvania he served as a member and president of the Quakertown borough council, headed the Selective Service Board there during World War II, and was a director of the Quakertown National Bank. One of his foremost civic accomplishments was the direction he gave in the organization of the Worthington Health Center.

He was a member of the Lehigh Valley Engineers Club, Allentown, Pa.

OTTO J. ZWIEBEL, '10

Otto J. Zwiebel passed away recently.

He was born in Waterbury, Connecticut, on February 3, 1887. He graduated as an electrical engineer from WPI in 1910.

For many years he served as a distribution engineer for Connecticut Light & Power Co. in Waterbury. He retired in 1955.

RALPH H. BOWERS, '11

Ralph H. Bowers, 84, died February 16, 1973 in Bath, Maine.

He was born in Boston, Mass., on August 5, 1888 and graduated as an electrical engineer from WPI in 1911.

For a number of years he worked as an assistant plant engineer at the Bath Iron Works. At one time he was with Hollingsworth and Whitney Company of Waterville, Me. He retired in the mid-1950's.

Mr. Bowers operated a ham radio station with the call letters of WIBYR. He was also active in Boy Scout work and the Masons.

FRED G. MUNSON, '12

Fred G. Munson, 84, president of W. M. Steele Co., Inc., Worcester, died on May 30, 1973 in Camden, Maine.

Mr. Munson had been visiting his daughter, Mrs. Marjorie Hanna of Rockport, Me., when he was stricken.

He was born in Webb City, Missouri. In 1912 he graduated from WPI as a mechanical engineer. He joined W. M. Steele in 1914 as a shop superintendent. Later he became treasurer, general manager, and president of the company.

Mr. Munson was a member of Tau Beta Pi, Sigma Xi, and was a past master of Isaiah Thomas Lodge of Masons.

Among his survivors who attended WPI are his nephew, GEORGE W. MUNSON, '30; his son RICHARD G. MUNSON, '38; and his grandson, DONALD G. MUNSON, '65.

STUART G. LEONARD, '14

Stuart G. Leonard died November 28, 1972 in DeLand, Florida.

He was born November 17, 1892 at Wilmington, Vt. After graduating from WPI as an electrical engineer, he joined Westinghouse Electric & Mfg. Co., in Pittsburgh, Pa. Later he was associated with North Electric Mfg. Co. and the Cleveland Railway Co., Cleveland, Ohio. From 1932 until his retirement in 1958 he was with the Fellows Gear Shaper Co., Springfield, Vt.

Mr. Leonard was a life member of AIEE. His son, STUART G. LEONARD, JR., was a member of the class of 1950.

CHARLES E. LYMAN, '15

Charles E. Lyman passed away on May 24, 1973 in New London, Connecticut. He was 81 years old.

Mr. Lyman studied civil engineering at WPI. For many years he was district manager of Brodhead-Garrett Co., Cleveland, Ohio.

He was a member of Phi Gamma Delta Fraternity.

VICE ADM. ROBERT F. BATCHELDER, '16

Vice Admiral Robert F. Batchelder, USN, ret., former commanding officer of the Naval Supply Depot in San Diego, Calif., died on May 24, 1973 in La Jolla, California.

Adm. Batchelder, 78, served continuously in the Navy Supply Corps from 1917 until 1957. He was commanding officer of the Naval Supply Depot (San Diego) from 1948 until 1951, when he left to become commander of naval supply activities in New York.

A Worcester native, he studied electrical engineering at WPI and later received his MBA from Harvard University.

He helped in the commissioning of the USS Lexington in 1927 and alternated between sea and shore duty until 1943, when he reported to the Atlantic Fleet's Amphibious Forces. He won the Legion of Merit with Gold Star for his part in the Normandy invasion, the Croix de Guerre with Palm, and other World War I and II campaign and service medals.

He was a director of the San Diego Council of the Navy League and the Navy Supply Corps School Alumni Association. He also belonged to the San Diego Chamber of Commerce and the La Jolla Country Club.

DAVID E. HARTSHORN, '17

David E. Hartshorn, 79, passed away on February 11 in Bethesda, Maryland.

After graduating from WPI as a civil engineer in 1917, he received law degrees from George Washington University and the University of New York.

For many years he was an examiner for the U.S. Patent Office. He was a member of the Engineering Society of Detroit.

JOHN M. LEGGETT, '17

John M. Leggett, 78, died March 20, 1973 in West Hartford, Connecticut.

A Waterbury (Conn.) native, he later graduated as an electrical engineer from WPI. He began his career with General Electric Co., Schenectady, N.Y. Then he moved to Scovill Manufacturing Co., Waterbury, Conn., and in 1922 joined Southern New England Telephone, Hartford. In 1959 he retired as district plant engineer.

Mr. Leggett was a life member of AIEE, the American Society of Civil Engineers, and the Society of Professional Engineers. He also belonged to the Telephone Pioneers of America.

RUSSELL H. SMITH, '17

Russell H. Smith died February 20, 1973 in Worcester.

He was born June 21, 1895 in Haverhill, Mass. He graduated from WPI as a civil engineer.

For a number of years he served as a superintendent at U.S. Envelope Co., Worcester, from which he retired in 1957. Previously he was associated with Warren Steam Pump Co., and Garitt Mfg. Co.

Mr. Smith was a member of Theta Chi and Skull. He was active in the Tech Old Timers' Club.

SAMUEL H. THOMPSON, '17

Samuel H. Thompson, 78, died March 31, 1973 in Worcester.

Mr. Thompson, a native of Worcester, graduated as a civil engineer from WPI. He worked as a structural engineer with Stone and Webster Co., Boston, until 1935 and later with the U.S. Bureau of Reclamation in Denver, Colo., until his retirement in 1963.

While in Colorado, he was responsible for pumping stations at many dams including the Hoover, Grand Coulee, and Flaming Gorge dams.

He was a member of Tau Beta Pi, Sigma Xi, and the Colorado Society of Professional Engineers.

ROBERT L. TOMBLEN, '17

Robert L. Tomblen, 81, died April 29, 1973 in Hartford, Connecticut.

The Pepperill, Mass., native, a graduate electrical engineer from WPI, was employed as a statistician for the American Telephone and Telegraph Co., New York City, for 30 years. He retired in 1947. From 1951 until 1961 he served as a volunteer attendant at Hartford Hospital.

Mr. Tomblen, who was also a graduate of Bates College, Lewiston, Me., was a charter member, historian, president, and past treasurer of the Telephone Pioneers of America. He belonged to the Hartford Tennis Club, the West Hartford Squires, and Alpha Tau Omega Fraternity.

EDWIN H. ROOT, '19

Edwin H. Root, 78, passed away on May 4, 1973 in Largo, Florida.

A retired real estate and insurance salesman, he was born in Waycross, Ga., on April 15, 1895. He studied electrical engineering at WPI and later received his MBA from Harvard Business School.

Mr. Root was a 55-year member and past commander in the American Legion. He also belonged to the Masons, the Shrine, and Alpha Tau Omega Fraternity.

DAVID ADELSTEIN, '28

David Adelstein, 65, died on April 5, 1973 at his home in Bronx, New York.

He was born in Worcester and graduated with a degree in electrical engineering from WPI in 1928. He was chief electrical engineer with the Army Corps of Engineers in New York City.

Mr. Adelstein was a licensed professional engineer in the state of New York. He also belonged to the New York State Society of Professional Engineers and the National Society of Professional Engineers.

HAROLD P. KRANZ, '29

Harold P. Kranz, retired district superintendent of the Massachusetts Electric Co., died February 11, 1973 in Quincy, Massachusetts. He was 66.

He was a Fall River native and a graduate electrical engineer from WPI. He was a member of Theta Chi and Skull.

Following a stint with the General Electric Co., he joined the New England Electric System in 1931 and worked for the Narragansett Electric Co. in Providence, R.I. In 1948 he became superintendent of overhead lines. He became affiliated with the Massachusetts Electric Co. in 1962 and retired two years ago as district superintendent of distribution of the South Shore area.

Mr. Kranz, who was a member of AIEE, was the brother of EDWARD L. KRANZ of the class of 1918.

WILLARD I. JOHNSON, '30

Willard I. Johnson, 66, passed away on March 7 in Arizona.

He was born in Worcester. After graduating from WPI as an electrical engineer, he spent 12 years with Consolidated Edison Co. in New York. Later he was with Joseph Dixon Crucible Co., Jersey City, N.J.; the Signal Corps Engineering Laboratories, Fort Monmouth; and the USASA Operational Center, Ft. Huachuca, Arizona.

Mr. Johnson was a member of IRE and Sigma Phi Epsilon Fraternity.

LUTHER R. EAMES, '31

Luther R. Eames died February 12, 1973.

He was born on May 29, 1908 in Worcester and later studied electrical engineering at WPI. He started his 28-year government career in 1942 with the Radio Direction Finding Branch.

From 1943 to 1948 he was a project engineer in the Suppression and General Engineering Branch where he was responsible for the design and development of the AN/URM-29 UHF noise meter used by the Signal Corps, Navy, and Air Force. In 1955

HAROLD B. WHITMORE, '21

Harold B. Whitmore, a Trustee Emeritus of WPI, died in June in Virginia.

He was born in Holyoke, Mass., on July 13, 1899. After graduating from WPI as an electrical engineer in 1921, he joined the U.S. Patent Office the following year. In 1934 he graduated from the University of North Carolina School of Law, and remained with the Patent Office until his retirement in 1966. In 1962 he became Superintendent of the Examining Corps (highest career position in the Patent Office) and later he was Advisor to the Commissioner and Deputy Employment Policy Officer.

As Superintendent he directed the Examining Corps, and was responsible for developing and utilizing standards of patentability and production, keeping the arts currently classified, training new examiners, evaluating the performance of the Corps, and other activities leading to the improvement of Patent Office services. In 1957 he received the Department of Commerce Silver Medal for his contributions and in 1966 he received the Department Gold Medal Award, the highest employee honor that the Department can bestow.

He received the Gold Medal Award for major contributions he had made to administration of a scientific-legal program, highly distinguished authorship, and exceptional contributions of major significance to both substantive and administrative programs of the Patent Office.

Mr. Whitmore was very active in the Patent Office Society, having served as President and Chairman of the legislative committee. In civic life he served as organizer and first president of the Vienna Recreation Association, playing a major part in the establishment of the first public park in Fairfax County, Va. He was also chairman of the board of the Providence Savings & Loan Association in Vienna, as well as chairman of the board of Horne of England, Gaithersburg, Md.

He belonged to Phi Sigma Kappa, Tau Beta Pi, Sigma Xi, IEEE, The American Bar Association, the American Association for Advancement of Science, and the American Legion. He was a member of the Bars of North Carolina, Washington, D.C., and of the Supreme Court.

Mr. Whitmore received the Robert H. Goddard Award from the Alumni Association in 1965 and was awarded an Honorary Doctor of Engineering Degree from the College in 1971.

Boomer

DONALD G. DOWNING, '26

Dean Emeritus Donald G. Downing, 68, former professor of mechanical engineering and a former dean of students and admissions at WPI, died April 4, 1973 in Worcester following surgery at a local hospital.

"Boomer", as he was affectionately known by everyone on campus, entered WPI as a civil engineering student in 1922, graduated in 1926, and with the exception of one year when he taught at Lehigh University (1926-27), served on the staff at WPI until he suffered a stroke in February of 1964. He was on leave of absence until 1968 when he was named to the school's emeriti ranks.

He became director of admissions in 1954 after many years as a professor of mechanical engineering and also director of the WPI Summer School.

In more than a decade as chief admissions officer at WPI, during the 1950's and 1960's, Dean Downing interviewed or supervised the interviews of more than a thousand prospective students and their parents each year. He also maintained correspondence with them until the admissions work was completed.

As chairman of the WPI scholarship committee, he handled the evaluation of students' credits, abilities, and financial needs. As dean of students, he supervised their counseling, their organizations, job placement, and publicity once they were on campus.

A Worcester native, he received his master's degree in mechanical engineering from WPI in 1937 and an honorary doctorate in engineering in 1961. Dean Downing was a member of Phi Sigma Kappa, Tau Beta Pi, Sigma Xi, Pi Delta Epsilon, Skull, American Society of Engineering Education, Association of College Admissions Counselors, Worcester Engineering Society, Eastern Association of College Deans, Society for Experimental Stress Analysis, and American Society for Quality Control.

Admired by all for his dedication to WPI and for his remarkable rapport with the students, he earned the appellation of "Boomer" during his teaching days when it was reported that even those sitting in the back row of the classroom could hear his lectures without straining their ears.

In 1960 when this picture was taken, Dean Downing was at his prime, well known by every WPI student.

He also portrayed W. C. Fields in a long-ago Tech Carnival which further reinforced his "Boomer" image.

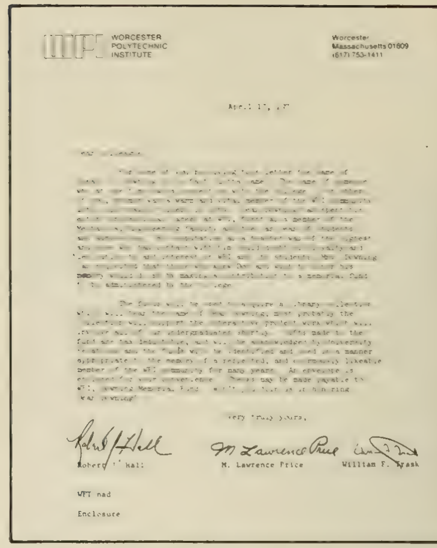
In the dean's office, Dean Downing had a reputation for being fair, no matter what the problem was, a fact which endeared him to the student body. "Oh, he could chew you out all right," a former student recalls. "But when his foot came down it didn't hurt too much because he always had a twinkle in his eye."

He was a long-time favorite of undergraduates and the classes of 1954 and 1965 dedicated their yearbooks to him.

Those who knew Dean Downing and wish to honor his memory are making contributions to the Downing Memorial Fund (see cut). The funds will be used by the college to acquire a library collection which will bear his name—a fine tribute to a respected man.

But perhaps the most fitting tribute of all came in a conversation overheard shortly after his death when one member of the WPI community observed to another, "I never heard anyone say an unkind word about Don Downing."

Dean Downing is survived by his widow, Olive Stevens Downing of Worcester; a son, Allan S. Downing of Needham, Mass.; a sister, Mrs. Ralph Quimby of Auburn, Mass.; a brother, ROLAND F. DOWNING, '32, of Meriden, Conn.; and four grandchildren.



WORCESTER POLYTECHNIC INSTITUTE

Worcester
Massachusetts 01609
(617) 753-1411

[illegible]

Very truly yours,

Robert [illegible] Hall M. Lawrence Price William F. Trask

WFT nad

Enclosure

The above letter was sent to present and emeriti members of the WPI staff and to the Class of 1926. Contributions from alumni from any class will be gratefully received and acknowledged.

he was promoted to section chief and pioneered in the establishment of radio interference measuring.

After working on Courier and MOBIDIC communication systems and receiving recognition for an assignment at Fishbowl-VLF Observation Station in the Marshall Islands, Mr. Eames was assigned to Goddard Space Flight Center from 1963 through 1966. He acted as an assistant spacecraft manager at Cape Kennedy launches. In 1966 he received a NASA Achievement Award for his contribution to the success of the first TIROS Operation Satellite.

Returning to ECOM as resident engineer for Lockheed in California in 1967, he assisted in the avionics system technical management for the Cheyenne AH-56A weapons systems. Later Mr. Eames was a member of the Standard Lightweight Avionics Equipment engineering team.

Upon his retirement he was awarded an achievement certificate "in recognition of his long and distinguished career in Federal Civil Service."

GORDON E. SIGNOR, '32

Gordon E. Signor, 62, passed away February 1, 1973 in Boston, Massachusetts.

Born in Waterbury, Conn., he later graduated from WPI as an electrical engineer. For many years he was employed by Scovill Mfg. Co., Waterbury.

He was a member of the Watertown (Conn.) Town Council, the Citizens Consulting Committee of Kaynor Regional Vocational Technical School, and the Watertown School Building Committee. Mr. Signor also belonged to Sigma Alpha Epsilon, the American Society for Metals and the Association of Iron and Steel Engineers.

He was a professional engineer in the state of Connecticut. At one time he served as vice president of the Hartford Chapter of the WPI Alumni Association.

BERTIL F. HAMMARSTROM, '34

Bertil F. Hammarstrom, 60, died March 26, 1973 in Worcester.

For 39 years he was an electrical engineer at Heald Machine Co., Worcester.

Mr. Hammarstrom was born in Worcester and graduated from WPI in 1934. He was a member of the Institute of Electrical Engineers.

E. HUGH OSBORNE, '34

E. Hugh Osborne, Sr., died March 30 in Concord, Massachusetts, following a long illness.

Following his graduation as an electrical engineer from WPI, he worked for many years at Westover (Mass.) Air Force Base. Three years ago he was transferred to Hanscom AFB in Bedford.

He was a member of Alpha Tau Omega and AIEE.

LADISLAUS T. JODAITIS, '35

Ladislaus T. Jodaitis, 59, died unexpectedly on May 18, 1973 in Weymouth, Massachusetts, after being stricken with an apparent heart attack at a swimming pool.

He was born in Gardner, Mass., and graduated from WPI as a civil engineer in 1935. He was with the Army Corps of Engineers in Waltham. During World War II and the Korean conflict he served as a lieutenant commander with the Public Health Service.

He was the father of FRANK T. JODAITIS of the Class of 1967.

YNGVE H. NORDSTROM, '36

Yngve H. Nordstrom, 61, died in the Memorial Hospital in Worcester on May 5, 1973.

He was born in Sweden on October 13, 1911. Following his graduation from WPI as a chemist, he joined the research laboratories of Norton Company, Worcester, as an engineer of organic development.

Later he was made chief of the organic bond unit and assistant director of research and development in charge of the abrasive section. In 1966 he was appointed technical associate to the director of research and development for the abrasive division.

Mr. Nordstrom was chairman of the board of directors of Anker House, Worcester, a home for delinquent boys. He was a member of Sigma Xi, the American Chemical Society, National Society of Professional Engineers, Worcester Economic Club, and Tau Beta Pi.

ROBERT A. SCHULTHEISS, '42

Robert A. Schultheiss, 52, manager of the thermostat metals department of Texas Instruments, Inc., Attleboro, Massachusetts, died April 19, 1973 in Attleboro.

He was born in Brooklyn, N.Y., graduated from WPI as a mechanical engineer, and during his career worked for General Electric Co., Schultheiss-Knight, The Robbins Co., and Fenwal Laboratories, Inc. Sixteen years ago he joined Texas Instruments as manager of field sales, metals and controls division.

Mr. Schultheiss was a past vice president of the Attleboro Chamber of Commerce and past president of the Junior Achievement Club. He was a former member of the Jaycees and an officer of the Attleboro branch of the Power Squadron. He was also a professional engineer in the state of Massachusetts, a member of the American Management Association, and chairman of the education committee of the U.S. Chamber of Commerce.

He was the brother of JOHN P. SCHULTHEISS, '41, and RALPH D. SCHULTHEISS, '44.

RICHARD F. DYER, '43

Richard F. Dyer passed away in November 1972 in Kingsport, Tennessee.

A native of Natick, Mass., he graduated from WPI as a mechanical engineer in 1943. After serving as a Lt. Commander in the Navy, he joined Tennessee Eastman Co., Kingsport, Tenn., where he became chief engineer.

Mr. Dyer belonged to ASME, the American Association for Textile Technology, and the American Association for Advancement of Science. He was a licensed engineer in the state of Tennessee and was a member of Phi Sigma Kappa.

LESLIE A. KEEFE, '56

Leslie A. Keefe died January 20, 1973 in Reading, Massachusetts, following a long illness. He was 38.

He was born in Lynn, Mass., and later was a student at WPI. For several years he was associated with Riley-Stoker Corp., Worcester. Ten years ago he joined the staff of Avco Corp. as a research engineer in the field of advanced technologies in power generation and depollution.

Mr. Keefe was a member of Sigma Alpha Epsilon Fraternity.

RICHARD P. IBSEN, '60

Richard P. Ibsen, 34, vice president of Ibsen Brothers, Inc. (building contractors), North Haven, Connecticut, died suddenly on March 5, 1973.

A native of New Haven, Conn., he later studied civil engineering at WPI, where he was a member of Sigma Alpha Epsilon.

Mr. Ibsen was a member of the North Haven Republican Town Committee.

VILHO J. KANGAS, '63 SIM

Vilho J. Kangas, 44, treasurer of G. F. Wright Steel & Wire Co., Worcester, died February 9 in Holden, Massachusetts.

He was born in Kortesjarvi, Finland, on June 11, 1928. He was graduated from Worcester Junior College, New England School of Accounting, and WPI's School of Industrial Management. For twenty years he was with the Wright company.

Mr. Kangas was a member of the National Association of Accountants. He served in the Navy in World War II.

FREDERICK S. SHERWIN, JR., '72

Frederick S. Sherwin, Jr., 29, died on March 10, 1973 in Jamaica Plain, Massachusetts following a long illness.

He was born in Paterson, N.J., on April 27, 1943. After graduating from Norwich University, Northfield, Vt., in 1966, he later received his master's degree in mechanical engineering from WPI. He served in the U.S. Army for three years, including a year in Vietnam, and was honorably discharged as a captain in June of 1971.

He received a Meritorious Achievement Award for his work at the Army Aviation Laboratory, Ft. Eustis, Va., and the Bronze Star for meritorious achievement in Vietnam.

Mr. Sherwin was the son of FREDERICK S. SHERWIN of the Class of 1941.

Your Class and Others

1902

The Rev. WINTHROP G. HALL, minister emeritus of Pakachoag Community Church of Auburn, Mass., and a former industrialist and executive of several social service organizations, received an honorary doctor of engineering degree from WPI at commencement. For 25 years he was associated with Spencer Wire Co., and was general superintendent of its Goddard Works at the time of its absorption into Wickwire Spencer Steel Corp. He became president of Charlton Woolen Co. in 1927, and still serves in that position. He had been active in religious work for more than 65 years and was ordained a Congregational minister in 1951.

1906

EDWARD WRIGHT, who worked as a state sanitary engineer until his retirement fifteen years ago, represents Precinct One in Dedham, Mass., at town meetings. He joined the town meeting in 1927, the year that limited membership was introduced, and has been there ever since.

1908

DONALD D. SIMONDS reports that after having lived alone for twelve years and getting tired of his own company, he is enjoying living with his daughter and her family in their spacious house at 2 Alexander Ave., Nutley, N.J. (He had lived for 43 years in his Worcester house prior to moving last winter.) He is especially happy with his new living arrangement and says, "Since my son-in-law is a doctor I should be pretty well taken care of for the rest of my life."

1910

CHARLES E. BARNEY writes that KARL E. HERRICK and his wife of Laguna Hills, Calif., report that they are fortunate to be in good health and enjoying golf and bridge to keep busy. The Herricks spent several weeks in Hawaii last fall and were planning to go to Palm Springs for a visit around Easter. . . . GEORGE F. (Hap) MARTIN and his bride of 65 years have moved again to Westminster, Mass. Throughout the years they have enjoyed good health and happiness in the vicinity of Worcester. They took time off this year for a seven-week visit to Florida. They have two daughters, one son, eleven grandchildren, and three great-grandchildren. Hap promises to write the history of his life since 1910 for future publication. . . . MR. BARNEY, who has served so faithfully as class secretary, suffered several heart attacks during the winter and is not certain that he'll be able to continue to send in the news. His classmates and everyone at WPI hope for his speedy recovery.

1917

HENRY W. SHELDRICK, formerly of Collier Keyworth Co., Gardner, Mass., has retired.

1919

RAY W. HEFFERNAN received an honorary Doctor of Business Administration Degree from Anna Maria College in Paxton, Mass., in May. He is chairman of the board of H. H. Brown Shoe Company, Inc., Worcester, and all its subsidiaries. He was a member of the first Diocesan Council of Administration and was named a Knight of Malta in 1946, and a Knight of the Holy Sepulcher in 1958 by Pope Pius XII. Currently he is an honorary trustee of Anna Maria and a trustee of Oblate College, Washington, D.C., and Rosemont College, Rosemont, Pa. He has also received an honorary degree from Holy Cross College, Worcester. He received the Robert H. Goddard Award from WPI in 1972. . . . GEORGE R. RICH, director and senior vice president in charge of power divisions at Charles T. Main, Inc., Boston, has been named an honorary member of the

Rich '19

Boston Society of Civil Engineers. Since joining Main in 1945 Mr. Rich has directed the design of many hydroelectric, thermal and transmission projects including the St. Lawrence and Niagara Power Projects. Current U.S. projects include the Blenheim-Gilboa pumped-storage hydroelectric project for the Power Authority of the State of New York and the Bear Swamp pumped-storage project at Rowe, Mass. He is also in charge of numerous major international power projects. Besides lecturing at Columbia and Harvard Universities, Mr. Rich has written several books on hydraulic engineering, including *Hydraulic Transients.*

1921

DR. JOHN W. WILLIAMS, professor emeritus of chemistry at the University of Wisconsin, received an honorary doctor of science degree from WPI at commencement. He is co-author of the book *Experimental-Physical Chemistry* and has written over 125 scientific papers and review articles.

RUSSEL B. HENCHMAN has retired. He was self-employed with Charles, Ryan, & Rivers, Los Angeles, Calif. . . . ALAN W. RUSSELL, a former self-employed dairy farmer in Burlington, Washington, has retired.

1922

GEORGE A. WALKER was presented a plaque by the Northern New Jersey Chapter at a chapter meeting held last February. He received the award in recognition of his many years of devoted service to the chapter and the college. Mr. Walker, who was formerly with New Jersey Bell Telephone Co. and later a self-employed consulting engineer, is now retired and living in Fort Wayne, Indiana.

Left to right: Victor E. Kohman, '43, chapter president; George A. Walker, '22; and President George W. Hazzard

1923

CARL M. HOLDEN not only has three sons who graduated from WPI (a total of six WPI degrees including one ME and one MSI), he also has three sons who have inherited his love of the out-of-doors and travel.

PAUL C. HOLDEN, '48, who is manager Engine Cooling and Combustion Engineering Department, Gas Turbine Division, Westinghouse Electric Corp., in South Philadelphia, enjoys canoeing. ROBERT W. HOLDEN, '55, a senior member of the faculty at Grossmont College, El Cajon, Calif., likes camping out in the remote areas of the High Sierras and Baja, California. A couple of years ago Bob and his family and Carl went on a camping trip throughout the British Isles and Scandinavia. PHILIP A. HOLDEN, '59, com-

puter systems supervisor for DuPont in Brevard, N.C., is also a camping and canoeing enthusiast.

So far Carl's travels in the near half of the world have extended to the Yukon, Northeast Finland, Leningrad, the Holy Land, East Africa, Southern Chile, and Hawaii. He also has visited all fifty states and all the Canadian provinces. And whenever he wants to relive some of the highlights of his tours, he can. He's made an extensive photographic record of them all—in living color!

1925

CHARLES V. MOREY has retired to Lake Worth, Fla. He was with Consolidated Edison Co., New York City.

1926

FRED H. HEDIN has retired from his duties as a consultant and is located in West Hartford, Conn. . . . STANLEY R. OSBORNE, former vice president and partner in Hubbard, Lawless & Osborne, Associates, New Haven, Conn., has retired. . . . PAUL S. OTIS has retired as a materials and research engineer at the N.H. Department of Public Works in Concord.

1927

JOHN E. HOWE, who was formerly with Sear-Brown, Rochester, N.Y., is a retiree. . . . ERNEST T. PARSONS has retired from the Public Service Co., Manchester, N.H.

1928

EDWARD A. HUBBARD is a retiree. He was with IBM Corp., Glendale Labs, Endicott, N.Y. . . . WALTON P. LEWIS has retired from Eagles Mere Realty, Gilford, N.H. . . . KARL W. PENNEY has retired from Norton Co., Worcester. . . . STANLEY H. PICKFORD is also retired. Formerly he was employed by Leland-Gifford Co., subsidiary of White Consolidated Industries, Worcester. . . . ELMER L. TAYLOR has retired from Norton Co., Worcester. . . . Currently JAMES W. TORRANT serves as general manager of Southern Pump & Supply Co., Tampa, Fla. . . . CHARLES A. WARREN, who was with United Aircraft Corp., East Hartford, Conn., is retired. . . . The former executive vice president at Leland Gifford Co., Worcester, ANDREW L. WILKINSON, has retired.

1929

JOHN D. PUTNAM, formerly with Norton Co., Worcester, is retired. . . . HAROLD P. RICHMOND has retired as president of Associated Energy Systems, Inc., in New Jersey and is now located in Durham, N.C.

1930

GARDNER F. DAVIS has retired. . . . Thirteen hundred well-wishers, including Gov. Francis W. Sargent, recently honored DANIEL S. HORGAN upon his retirement as chief engineer of the Massachusetts Department of Public Works. Gov. Sargent, who was one of the speakers at the testimonial dinner which was held in Framingham said, "As far as I'm concerned there is and has been only one *chief* engineer of the DPW. And that's Dan Horgan." Horgan, who retired in February, was with the DPW for 43 years. . . . LINCOLN B. HATHAWAY is a recent retiree. Formerly he was a project engineer at Revere Copper & Brass, Inc., New Bedford, Mass. . . . WILLIAM W. JASPER is retired. . . . Also retired is RUSSELL J. LeBOSQUET. He was with Wisconsin Power & Light Co. in Madison. . . . DANIEL F. O'GRADY writes that he is retiring in July after 43 years of "steady employment." He has been assistant general manager of public relations for New England Telephone & Telegraph Co., Boston. He says he is enjoying his good health and five grandchildren, including Dan F. III. Mr. O'Grady is a trustee of WPI. . . . WILSON H. RICE, former value engineer at Hamilton Standard, Windsor Locks, Conn., has retired. . . . JOHN H. WELLS is now manager of scientific computer applications for United Engineers & Constructors, Inc., Boston.

1931

EDWARD D. AMSDEN works for International Packings Corp., Bristol, N.H. . . . CLARENCE L. BUELL is a retiree. Formerly he was owner of Lawn Mower & Garden Tractor Sales & Service, Trumbull, Conn. . . . DANIEL P. DYER is now retired. He was a chief test engineer at Budd Automotive, Detroit, Mich. . . . A. WALLACE GOVE has joined Wescor Parking Systems Corp., Worcester, as a traffic engineering consultant. Retired last fall as director of the Bureau of Transportation, Planning and Development for the Massachusetts DPW, he was also Worcester City Traffic engineer from 1942 until 1965. In his new assignment with Wescor, he will consult on traffic and capacity counts and design for parking garages and lots in the city. . . . JOSEPH E. TOTAS has retired. He was with American Steel & Wire, Worcester.

1932

ELIEZER ARONOV has retired as director of the parking authority for the Municipality of Tel-Aviv Jaffa, and is now located in Rome, Italy. . . . THEODORE H. BERARD, a teacher at Athol (Mass.) High School since 1936 and guidance director for the past fifteen years, is retiring this summer. He taught French and started the guidance system at the school. After graduating from WPI as a mechanical engineer, he received a MA from the University of Toulouse, France, and a MA in education from Clark University, Worcester. . . . EINO O. LEPPANEN is retired from his duties with Mobil Oil Corp., Riverside, R.I.

1933

Currently MANNING HOLOFF is president of manufacturing, Magna-Lites, Manning Holoff Co., Los Angeles, Calif. . . . EDWIN L. JOHNSON, vice president of operations for the Connecticut Light and Power Company, spoke on "Public Utilities and the Energy Crisis," at a recent meeting of the Meriden (Conn.) Industrial Management Club. . . . JOHN C. KEEFE, city manager of Modesto, Calif., learned in April that his city had won one of eleven 1972 All-American Cities Awards. Last year Keefe decided to lead Modesto's second bid for the honor (it had won in 1955) when a citizens' group turned over a museum of art and history they had renovated to the city. Keefe, who plans to retire in December, was a former city engineer in Northampton, Mass. He later was employed as public works director in Annapolis, Md., and Palm Springs, Calif. For six years he was city manager for San Bruno, Calif. . . . FREDERICK M. POTTER has retired as chief engineer of rotary equipment at The Bendix Corporation's Electric Power Division after completing nearly 40 years in the electric power generating field. During this time he has acquired a reputation as an industry authority on light-weight aircraft generators. He was awarded 25 patents while with Bendix and has several applications pending. Potter led the development of the present Bendix line of DC and starter generators and air-cooled brushless AC generators. He was appointed assistant chief engineer in 1960 and chief engineer in 1968.

1934

CLARENCE W. ANDERSON, who worked as superintendent of engineering at Norton Co., Worcester, for many years, retired in February. . . . RUSSELL P. HOOK is manager of research and engineering in the grinding machine division of Warner & Swasey, Worcester.

1935

JOSEPH GLASSER, a Raytheon Company vice president, has been named to the newly established post of manufacturing manager for the company's Missile Systems Division. He will be responsible for all manufacturing operations in the division, which is the largest operating unit in the company. In addition, he will continue to serve in his present position as Andover plant manager. He has been with Raytheon since 1945. Recently he received an Honorary Doctor of Science Degree from Lowell Technological Institute. . . . Currently PAUL S. KRANTZ is with Kropp Forge Co., Chicago, Ill. Kropp is a division of Anadite, Inc. . . . EVAN C. LUCE has retired as senior product engineer at Norton Co., Worcester. . . . WILLIAM J.

SAMBORSKI is now a senior engineer at Norton Co. . . . DR. IRVING SKEIST, president of Skeist Laboratories, Inc., Livingston, N.J., is also a co-director of the Adhesives Institute, a division of the Laboratories. The Institute provides research and development services to raw materials suppliers, formulators, and end users. Dr. Skeist recently lectured on adhesives throughout the United States under the auspices of the American Chemical Society.

1936

ROBERT W. BAKER works at National Standard Co., Worcester. . . . ROBERT E. MAYNARD is with Varian Co., Lexington, Mass.

1937

HERBERT G. GUSTAFSON is employed by Warner & Swasey Co., Grinding Machine Division, Worcester. . . . FRANCIS S. HARVEY, president of Harvey & Tracy, Associates, Inc., Worcester, has received the eighth Ralph W. Horne Award from the Boston Society of Civil Engineers. His citation read in part that he is a "dedicated civil engineer for his efforts over many years to better the community on various boards and committees and local governments, hospitals, and youth organizations." Mr. Harvey is a trustee of WPI and St. Vincent Hospital, Worcester, where he is also director of the St. Vincent Hospital Research Foundation. It was announced in April that he will head the 1974 Bishop's Fund for the Worcester diocese. In May he received a certificate of recognition for his work on behalf of the engineering profession at a dinner sponsored by the Central Massachusetts Chapter, National Society of Professional Engineers. NORTON S. REMMER, '60, senior building inspector and plans examiner in Worcester's Bureau of Public Buildings, presented the award. . . . CHARLES R. MICHEL is manager, Employee Information Services, Atlantic Richfield Co., Los Angeles, Calif. . . . Prof. RAY K. LINSLEY was awarded the D. Sc. degree by the University of the Pacific at its commencement on May 27 for "Outstanding Contributions to Engineering and Engineering Education." He has been a professor of civil engineering at Stanford University since 1950 and has served as department head and associate dean. He was also director of the program in engineering-economic planning aimed at bringing engineering students more deeply into social, economic, and political aspects of public works. Since 1968 he has served on the National Water Commission which submitted its final report, "A Water Policy for the Future," to the president and congress in June.

New association president's hats for 3 alumni

Economou '44

Tarr '45

Three WPI alumni, already presidents or executive officers of their own companies, have again been named presidents. This time they head trade group associations which are national and international in scope, have memberships of thousands, and which represent billions of dollars worth of products and equipment.

ROBERT H. FIELD, '38, owner-president of Field Concrete Pipe Co., Wauregan, Conn., was recently installed as president of the American Concrete Pipe Association at the association's annual meeting in Washington, D.C. He served as vice president last year and has been a member of the board of directors since 1967. Previously he was with Wickwire Spencer Steel Co., and the American Thermos Bottle Co.

NICHOLAS N. ECONOMOU, '44, president and general manager of Western Road Machinery Co., Salt Lake City; president of Western Road International, Salt Lake City; and president of Southwest Machinery Co., Phoenix, Ariz., has been elected president of

Field '38

Associated Equipment Distributors, the 1,400-member international association of the construction equipment industry. The new president heads an association representing more than 80 percent of the nation's $4 billion construction equipment industry.

PHILIP V. TARR, '45, is the newly-elected president of Metal Powder Industries Federation, a trade group representing the metal powder producing and consuming industries. He is executive vice president of Midwest Sintered Products Corp. of Riverdale, Ill., a company which he helped to found 19 years ago. He has served as president of the Powder Metallurgy Part Association and was on the Board of Governors of the Metal Powder Industries Federation.

1938

WALTER J. HOWARD is a retiree. Formerly he was a solid state physicist with the Air Force Logistics Command, Wright-Patterson AFB, Ohio. . . . FRANCIS H. JENKINS is a self-employed real estate broker. . . . ROBERT B. KEITH, who was an industrial engineer for U.S. Steel Corp., Pittsburgh, has retired. . . . BASIL C. KIMBALL is plant manager at Chelsea Memorial Hospital, Chelsea, Mass. . . . DANA D. STRATTON is currently the director of the Engineering Specifications and Standards Department, Naval Air Engineering Center, Philadelphia, Pa. His son, Wayne, is studying electrical engineering at WPI. . . . MASON B. WHITING is a self-employed real estate broker in Redding Ridge, Conn.

1939

FRANK L. ABBOTT, JR., is product manager for Cincinnati Milacron in Germany. . . . THOMAS F. BEATTY, JR., works for RCA, Burlington, Mass. . . . STEPHEN A. LINCOLN is with Anken Industries, Williamstown, Mass. . . . ROBERT B. MIRICK has retired as president of Sanitary Farm Dairies, Inc., St. Paul, Minn. . . . RICHARD J. MULLER works for Gerber Scientific Instrument Co., South Windsor, Conn. . . . ANDREW SHULTZ is employed by Stepan Chemical Co., Northfield, Ill. . . . RICHARD B. WILSON is a district staff engineer at Long Beach Unified School, Long Beach, Calif.

1940

HOWARD L. ANDERSON works for W. W. Clark Co., Cleveland, Ohio. . . . LEWIS F. BEHRENT, who is self-employed, is located in Issaquah, Wash. . . . WARREN C. HOTCHKISS serves as a self-employed manufacturers' representative in Chicago Heights, Ill. . . . J. STANLEY McKEOWN has retired. He was with Texaco Research Center, Beacon, N.Y. . . . FREDERICK B. MILLER is with IVI Travel, Inc., Deerfield, Ill.

1941

National Blank Book Co., Inc., Holyoke, Mass., employs SYLVAN A. GENTHNER. . . . Reverend EDWARD G. JACOBER is with the Christian & Missionary Alliance Mission, Dayton, Ohio. Previously he was doing

missionary work in Gujarat, India. . . . WALTER S. KNIGHT works for Wyman-Gordon Co., Harvey, Ill. . . . F. WILLIAM ZIEGLER is now assistant vice president, Domestic Communications Satellite System, for Western Union in Upper Saddle River, N.J.

1942

ALLAN G. ANDERSON is assistant to the director of operations in the Quincy (Mass.) Shipbuilding Division of General Dynamics. . . . WILLIAM B. DODGE works for All State Engineering, Trenton, N.J. . . . HERBERT M. GOODMAN, president of Herbert Engineering, Worcester, was recently awarded a Professional Manager Citation from the international headquarters of the Society for Advancement of Management. He was awarded the citation because of his contribution to high business ethics, his effective use of scientific managerial principles in the management of his business, and his personal contributions to civic affairs. Goodman has served as a director, vice president, and president of the Worcester chapter of the Society for Advancement of Management. . . . VICTOR H. THULIN currently holds the position of assistant research consultant at U.S. Steel Corp., Monroeville, Pa. . . . JOHN J. TYNER, who has been with Dow Corning Co. for 27 years, was recently promoted to West Coast general manager with offices in Alhambra, Calif. . . . DR. FRANK T. BODURTHA was co-author of "Discharge of Heavy Gases From Relief Valves", an article which appeared in the April issue of *Chemical Engineering Progress*. Presently he is a senior consultant in air pollution abatement, Engineering Service Division, DuPont Co., Wilmington, Del.

1943

AVERILL S. KEITH now works at New Jersey Bell Telephone Co., Newark, N.J. . . . RICHARD S. ROBINSON is with Futurous, Inc., North Brookfield, Mass. . . . DONALD M. ROUN serves as vice president-sales distribution, at National Union Electric Corp., Greenwich, Conn.

The supercritical wing which was recently developed by DR. RICHARD T. WHITCOMB, '43, in wind tunnels at NASA's Langley Research Center, Hampton, Va., and tested at NASA's Flight Research Center, Edwards, Calif., has also been undergoing commercial development at the LearAvia Corporation, Reno, Nevada. Actual construction of the first wing that will be used on a commercial aircraft is slated for later this year.

According to William P. Lear, developer of the Learjet, the wing will be capable of increasing the cruise speed of the Learjet almost 10 percent and the range by approximately 20 percent without any increase in power or gross weight.

Other aircraft companies have indicated their interest in the new airfoil shape for possible business jet aircraft design.

The planform shape of the supercritical wing tested at the Flight Research Center is representative of a wing that would be used on a commercial jet transport. Over 75 flights have been made during the past two years and have successfully demonstrated that the new airfoil does permit the aircraft to operate approximately 15 percent more efficiently.

The new airfoil shape incorporated in the supercritical wing design has a relatively flat upper surface as opposed to a curved surface on the top of a conventional wing. This feature delays the formation of supersonic shock waves which increase aerodynamic drag and permits the aircraft to cruise at a higher speed.

Additional flight testing of the supercritical wing concept will be done at NASA's Flight Research Center using a variable-sweep wing F-111 aircraft modified to incorporate the new wing design. These flights will study the application of the supercritical wing and its effects on maneuverability and performance of a military aircraft. First flights in this joint NASA-USAF program are expected later this summer.

MORGAN
CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1944

WILLIAM BROWN, JR., has a position with the Marian County Health Association, Indianapolis, Indiana. . . . CHARLES S. COOPER was recently named chief engineer of Lawson-Hemphill, Inc., Central Falls, R.I., developers and manufacturers of the Fiber Analysis Knitter. He was formerly senior electronic engineer with Scott Testers, Providence, and he became acting chief engineer for Scott in 1970 when it was a division of the Bendix Corp. Later he was senior instrument engineer for Precision Scientific Co., Chicago, which purchased Scott Testers from Bendix. . . . EINAR A. ERIKSEN serves as plant manager at Waldes Kohinoor, Inc., Long Island City, N.Y. . . . Presently EVERETT M. JOHNSON is assistant manager-program coordination and planning, Texaco, Inc., Research Center, Beacon, N.Y. . . . SIDNEY STAYMAN works as a sales representative for Carrier Container Corp., Long Island City, N.Y. . . . GEORGE E. TITTERTON is a self-employed sales consultant in Chicago, Illinois.

Myers '45

1945

DR. JOSEPH D. CARRABINO, professor of management in the Graduate School of Management, UCLA, Los Angeles, is board chairman of Engineering and Management Sciences Corp. (EMSCO). He is also a director of Consyne Corporation, Glendora, Calif., a fully integrated manufacturer and marketer of products for the health sciences. . . . DR. CARL C. CLARK, chairman of the Life Sciences Department at WPI, was the author of "The Agent-Hazardous Products and the Prediction of Injuries," in the February issue of *ASSE Journal*. He is also vice president of The Worcester Community Television Council. . . . ALBERT F. MYERS has been appointed vice president-group executive of Lear Siegler, Inc.'s furniture operations in Birmingham, Mich. He was president of the LSI Borroughs Division for the past three years. In his new position, Myers will have the presidents of six LSI furniture operation divisions reporting to him. He joined Borroughs Division as manufacturing manager in 1965 and later became vice president, general manager, and president of the division. Presently he is serving as the industrial chairman of the United Way Fund Campaign in Kalamazoo, Mich. . . . FRANK J. STEFANOV currently serves as assistant manager-roller products at The Torrington Co., Torrington, Conn. . . . The Rev. EDWARD I. SWANSON was recently honored with a Freedoms Foundation Award for his work as editor of *The Link*, the magazine of the General Commission on Chaplains and Armed Forces Personnel. He was reappointed as staff executive of the commission. Since 1971 Rev. Swanson has served as director of publications. The General Commission and *The Link* also received Freedoms Foundations Awards.

ROGER PERRY's Naval Reserve Public Affairs Company has made a clean sweep of public relations awards for their planning and handling of a special events program for teen-age guests from all over the nation for the June 1972 turnaround cruise of the USS Constitution in Boston Harbor. Awards included a George Washington Medal from the Freedoms Foundation, the Silver Anvil Award from the Public Relations Society of America and the Boston Publicity Club's first Super Bellringer Award. Roger, who is a reserve commander, is Director of Public Relations at WPI.

1946

PETER J. FORD, the owner of P. J. Ford Co., Worcester, is now retired. . . . THEODORE E. GAZDA currently serves as a project manager for Arthur G. McKee & Co., Cleveland, Ohio. . . . The DONALD H. GILMORES have returned from Antigua, BWI, where they celebrated their 25th wedding anniversary aboard the schooner "Fantome" cruising and touring the Leeward-Windward Islands. Mr. Gilmore is with Rodney Hunt Co., Orange, Mass. . . . WILLIAM R. GROGAN, dean of undergraduate studies at WPI, has been reappointed to a three-year term on the Worcester Diocesan Board of Education. Last spring he was named an honorary Colonel by the WPI ROTC battalion in recognition of his contributions to the student body.

ERNEST S. HAYECK has been unanimously confirmed as a full-time judge in Worcester Central District Court following his appointment by Governor Francis Sargent. For the past three years he has served as a part-time special justice for the court. Judge Hayeck is only one of two WPI alumni known to be appointed as judges. (The other is JOSEPH S. VIROSTECK, '33, special justice at the Second District Court in Uxbridge, Mass.) Previously Judge Hayeck was with Mullaney & Hayeck, Worcester. . . . J. KENNETH PETRY has retired. He had been operating his own contracting firm.

1947

DR. MORRELL H. COHEN, Louis Block Professor of Physics and Theoretical Biology at the University of Chicago, was awarded an honorary doctor of science degree from WPI in June. From 1968 until 1971 he was director of the University's James Franck Institute.

ERNEST E. KIMBALL is a senior engineer at Harvard University, HMS Power Plant, Boston. . . . PAUL D. O'DONNELL has been named general manager of the Westinghouse Specialty Metals Division at Blairsville, Pa. Formerly he was director of headquarters manufacturing services. He joined Westinghouse in 1954 and has held a number of managerial positions, mostly in the Pittsburgh area. In 1971 he served as national president of the American Institute of Industrial Engineers. He has also lectured on production and industrial topics at Northeastern University and the University of Pittsburgh.

1948

JOHN J. CONCORDIA is with GTE Sylvania, Waltham, Mass. . . . JOHN M. PETRILLO is a marketing representative for IBM, Waltham, Mass. . . . DANIEL H. SHEINGOLD, technical marketing manager for Analog Devices, Inc., was the author of "Approximate Analog Functions with a Low-Cost Multiplier/Divider" which appeared in the February 5 issue of *EDN*. . . . DR. ALBERT H. SOLOWAY has been appointed acting director of the Graduate School of Pharmacy and Allied Health Professions at Northeastern University. He joined the faculty in 1965 as a chemistry lecturer and in 1968 was appointed a full professor. Previously he was engaged in research at Massachusetts General Hospital, Harvard Medical School, and Eastman Kodak Co. For two years he was a post-doctoral fellow with Sloan-Kettering Institute for Cancer Research.

Mike Curtis' low-flying airplane

The F-111, the controversial aircraft which has been described as full of bugs by the popular press, actually has been doing a very effective job according to F. A. (Mike) CURTIS, JR., '48, in a recent letter to Prof. Emeritus Kenneth Merriam. Curtis, who is Director of Product Engineering at the Fort Worth (Tex.) Operation of Convair, General Dynamics, is concerned with the engineering aspects of all F-111 and FB-111 programs. He is also concerned with the engineering aspects of contracts, budgets, and manpower allocations, although he is primarily involved personally with technical problems. Along with his regular job, he is deputy to the vice president of research and engineering. He has made a deep personal commitment to the F-111 programs.

He indicates that in 1968 it was discovered that a serious fatigue problem existed which could have limited the aircraft and that there was a material flaw in one steel forging, but that eventually both problems were solved. "These two events got me deeply into tests, analysis, etc., of high heat treat steel and I still wander around with a pocket microscope acting like a metallurgist," he says. "It takes me back to the strength of material course I took at WPI."

The testing paid off. At present there are about 500 aircraft in fleet operation and the early Tactical Air Command aircraft, the F-111A's, did very well in North Vietnam last fall. They flew into the Hanoi-Haiphong area at night at 200 feet on automatic terrain following radar and did a very effective job. They kept the pressure on the enemy 24 hours a day including the monsoon season when other aircraft couldn't fly. The planes are based at Takhli about 90 miles north of Bangkok and are capable of flying over rugged, steep terrain.

Not only has the aircraft proved itself on the job, it also has met stringent contract requirements. "With slight changes in local design and with the addition of about ten pounds of weight to the airplane, we not only met the ten-year life span stipulated in the contract, we also demonstrated by fatigue testing that the life span of the aircraft could extend up to 25 years under the most severe spectrum that could be utilized," Curtis recalls.

In spite of the problems that he has run into in his profession, notably with the F-111 programs, Curtis declares, "If I had to do it all over again, I would still pick aeronautical engineering. It leads to tremendous challenge in management, while providing a great sense of accomplishment. The business has its difficult sides. It is very excruciating when you lose an airplane and the crew, particularly if the cause was a design item you think you could have done better on."

But there are victories, too. The F-111's, for example, managed to weather bad luck and bad publicity. Ultimately, reports from veteran pilots who flew them, filtered back to Curtis—and the rewards of his profession were spotlighted once again in the successes of the Air Force team.

One pilot said that the aircraft succeeds where a high-altitude bomber cannot because of its TFR capabilities. It can come and go before any radar or human eye can frustrate it. Another was convinced that he wouldn't mind flying the One-Eleven through the Grand Canyon at night—below the rim! Still another indicated that the airplane made him feel like he was the world's greatest natural pilot.

Air Force Col. William R. Nelson, who was the commanding officer of the F-111's in Southeast Asia, reported at a recent press conference that the swing-wing jet proved to be the most survivable attack plane in the war. "Between late September and mid-March," he said, "The F-111's flew more than 4,000 (single) combat sorties. The loss of six planes (reported in that period) produces a loss rate of only .15 percent. No other attack plane in the war has come even close to this survival record."

However, it is not only Curtis and the veteran pilots who believe in the F-111. The Russians singled out the aircraft for discussion at the SALT talks, where it became quite evident that they did not like it one little bit. And the recent enemy in Vietnam? They hadn't heard that the American press had written off the F-111 as "buggy." For them, it did exactly what it had been designed to do. After their first encounter with the F-111 they promptly tagged it "Whispering Death."

Taylor '49

1949

Currently EUGENE S. BRIGGS serves as general manager at Scott Midland, Alden, N.Y. . . . LOUIS J. DOUGALL works for Honeywell, Inc. . . . DONALD TAYLOR was recently named vice president-operations of Rexnord, Inc., Milwaukee, Wis. He joined Nordberg Mfg. Co. in 1969 as executive vice president. He had been president of the George J. Meyer Division of ATO, Inc. In his new position he will be responsible for the Nordberg Machinery Group which has five operations in three states and Canada and eight worldwide. Taylor, who is a trustee of the Machinery and Allied Products Institute and a member of ASME, is also a registered professional engineer.

1950

GLENN E. FROM is now senior program development engineer for Lockheed Aircraft, Burbank, Calif. . . . Currently BARTLETT H. HASTINGS is field director for Boy Scouts of America, Bucks County Council, Inc., Doylestown, Pa. . . . KENNETH W. PARSONS is coordinator of employee relations at Norton Co., Worcester.

1951

LEON H. BASSETT, vice president of Skil Corporation, Chicago, is on a special one-year assignment in Japan. He expects to return to this country in the fall. . . . Presently DEXTER E. CATE serves as a systems engineer for International Packings Corp., Bristol, N.H. . . . R. ROSS CHAPIN, JR., has a position with Beecham, Inc., Piscataway, N.J. . . . WILLIAM J. CUNNEEN is a consultant with Stone & Webster, Boston. . . . ROBERT D. FULMER, JR., was recently appointed manager of mechanical and nuclear sales for the General Electric Company's Installation and Service Engineering Department. He is responsible for planning and coordinating the department's overall service sales effort for mechanical and nuclear products. In 1956 he joined GE as a product planner in the medium induction motor department. In 1970, following a series of promotions, he became manager of logistic support planning for I&SE. . . . THOMAS F. HOVEY, JR., works in the North Communications Area, Griffiss AFB, Rome, N.Y. . . . W. EVANS JOHNSON is president of St. Johns Chemical Corp., Jacksonville, Fla. . . . LEO E. LEMERE, JR., currently serves as computer services manager at The Badger Co., Inc., Cambridge, Mass. . . . KIRKE LEONARD is with Glen Mar, Inc., Hermosa Beach, Calif. . . . A. W. (Bill) LINDER is on the technical staff of Bose Corporation, Framingham, Mass. Bose manufactures high fidelity products. Previously Linder was with H. H. Scott, Inc., Maynard, Mass. . . . PHILIP MICHELMAN is now a sales representative for Mobil Chemical Co. (Films Dept.), Macedon, N.Y. . . . ROBERT W. RIPLEY works as a plant supervisor at Xcel Corp., Newark, N.J. . . . LAWRENCE F. SCINTO is with Fitzpatrick, Cella, Harper, and Scinto, New York City. . . . ALFRED J. WHEELER has a position with Raytheon in Waltham, Mass. . . . ROGER E. WYE is vice president of engineering and program management for the Litcom Division of Litton Industries, Melville, N.Y.

1952

Married: GEORGE F. WHITTLE and Mrs. Georgia Hession Flanagan in Cohasset, Massachusetts on April 29. Mrs. Whittle is an art teacher at Cohasset High School. Her husband, a commander in the Naval Air Reserve, is self-employed as a manufacturers' representative.

ROCCO R. DiVERDI works at Raytheon Co., Sudbury, Mass. . . . JEAN T. FARLEY has joined West Michigan Hydraulics in Kalamazoo.

1953

ROBERT T. BAXTER, SIM, works for Steel-Fab, Inc., Fitchburg, Mass. . . . JOHN R. BLACK serves as a design engineer at MSI Industries, Inc., Denver, Colo. . . . RICHARD A. DAVIS has been appointed director of manufacturing for the Thermos Division, King-Seeley Thermos Co., Norwich, Conn. He will assume responsibility for all production operations, manufacturing engineering, industrial engineering, materials control, and quality assurance at the Laurel Hill and Taftville plants. Since 1953 he has been associated with the General Electric Co., his most recent assignment having been as plant manager for the GE Portland (Me.) Power Generation Products facility. He takes to Thermos a career of manufacturing management, process development, glass and vacuum technology, facilities engineering, and high volume production. . . . EDWARD H. DIAMOND is currently employed by Grumman Corp., Bethpage, N.Y. . . . LCDR DAVID B. HATHAWAY is now assistant public works officer (U.S. Navy) at the Boston Naval Shipyard, Lexington, Mass. . . . D. ALDEN JOHNSON is seeking the three-year term on the expanded school committee in Sturbridge, Mass. He is employed as a manager by IBM Corp., Worcester. . . . MANUEL A. LOPEZ has retired. He was with Pralven-Polly, Caracas, Venezuela. . . . ROBERT A. PRATT works for Kearny Co., Tucker, Georgia.

1954

TUL R. FREDERICKSON is with C. B. Blair, Rutland, Mass. . . . Olin Corp., Stamford, Conn., employs GERARD E. GRISE. . . . DAVID L. NICKERSON works for Korsil Corp., Chicopee, Mass. . . . WILLIAM O. ROBINSON is regional operations manager for SSI Trailer Corp., Vernon, Calif. . . . WILLIAM SCHOENEMANN serves as director-manufacturing for Microform Data Systems, Mt. View, Calif. . . . HUGH K. TUFTS, JR., is a design engineer for Waters Mfg., Sudbury, Mass.

1955

HUGH C. BELL is president of Dataline Corp., New Canaan, Conn. . . . RICHARD F. CROOK works for G & O Mfg. Co., New Haven, Conn. . . . NORMAN M. LAWRENCE is with Curtiss-Wright, Wood Ridge, N.J. . . . RICHARD C. LINDSTROM currently serves as chief, project quality engineering, Pratt & Whitney Aircraft, East Hartford, Conn. . . . MARTIN A. RAFFERTY is employed by Essofield-Technical, Esso Standard Libya, Inc., in Tripoli, Libya. . . . DR. WILLIAM R. TAYLOR was a recent guest speaker at a meeting of the Connecticut Association for Children with Perceptual Learning Disabilities. A child psychiatrist, he is an associate professor in the department of psychiatry at the University of Connecticut School of Medicine. He is also a diplomate of the American Board of Psychiatry and Neurology. . . . JOHN W. WELSH works as an electrical engineer for Digital Equipment, Maynard, Mass.

jamesbury

manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves

Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

1956

ALAN M. ADAMSON is a generation studies engineer at New York Power Pool, Schenectady, N.Y. . . . DAVID S. BECKER works for Sylvania Electric Products, Inc., Waltham, Mass. . . . HOWARD H. BROWN is a graduate student at Boston University . . . LEBBEUS S. CASE, SIM, is employed at Brand-Rex, Willimantic, Conn. . . . BERNARD R. DANTI is with Millipore Corp., Bedford, Mass. . . . ROBERT A. FOISIE, who is self-employed as a management resources consultant, resides in West Hartford, Conn. . . . The Rev. FRANK H. GROSS serves as executive secretary of the New Hampshire Council of Churches. . . . DR. RAYMOND R. HAGGLUND has been promoted from associate professor to professor in the Mechanical Engineering Department at WPI. . . . ROY F.

STONE is a partner in Colonial Data Systems Inc., Marlboro, Mass. He serves as a data processing consultant. . . . HARRY TENNEY JR. has been appointed manager, Extruded Products, for the newly formed XCEL Corporation, Newark, N.J. A former product manager with Celanese Plastics Company, he previously served with Shield Ware, Inc. and Dow Chemical Co. . . . EDWARD R. WIOT is a staff consultant at NUS Corp., Rockville, Md.

1957

SALVATORE H. BELLO works for Boston Insulated Wire, Dorchester, Mass. . . . DANIEL A. BUNDZA has been named a senior engineer for New England Power Service Co., a subsidiary of New England Electric System, Westboro, Mass. He has been with the company since 1957 and is a registered professional engineer. . . . Currently MURRAY A. CAPPERS JR. is engineer-in-charge at Factory Insurance Association, Cranford, N.J. . . . ALAN J. CARLAN is now a member of the technical staff at Rockwell International, Anaheim, Calif. His wife, AUDREY CARLAN, is an associate professor of mathematics at Los Angeles Southwest College. . . . ERNEST R. COMTOIS, SIM, formerly with Morgan Construction Co., Worcester, has retired. . . . ROBERT D. FALLSTROM is a PhD candidate at Southern Methodist University, Information and Control Sciences Center, Dallas, Texas. . . . EDWARD J. FOLEY serves as a financial analyst at Norton Co., Worcester. . . . ELLIOTT C. HEITH is a senior staff associate in physics at Columbia University, New York City. . . . Bendix Corp., Teterboro, N.J., employs KENNETH E. HERMANCE as a systems engineer. . . . CHARLES C. JOHNSTON has founded Insurance Systems, Inc., of Braintree, Mass. Johnston is president of the firm which designs, programs, and implements computer program systems for the servicing of "no fault" automobile insurance for insurance carriers throughout the country. Recently he was elected as a director of Computrol, Inc., a multi-market company based in Providence, R.I. . . . FRED C. MAGNUSON JR. works for New Jersey Bell in Newark. . . . LEON A. MORGAN has been elected vice president of operations at the United Illuminating Co., New Haven, Conn. Earlier this year he was named general operations manager. He joined UI in 1967 and was appointed engineering manager in 1968. . . . In May NORMAN C. RISTAINO was awarded the Franklin (Mass.) Rotary Club's Good Citizen of the Year Award because he has been "outstanding in the field of community service and for the town of Franklin." In 1967 he received the Franklin Jaycees' Distinguished Service Award. For ten years he was a member of the town's planning board and served with the Board of Public Works for nine years. He was very active with the Softball League, Outdoor Club and March of Dimes. Ristaino is a program analyst at the U.S. Army Labs in Natick, Mass. . . . RONALD A. SAMPLIAN served as service planning engineer at Singer, Industrial & Bobbin, New York City. . . . ROBERT A. WHITE has joined Trans Service, Inc., Burlington, Mass.

Tenney '56

Dalton '58

Costello '59

1958

NORMAND L. BEDARD has been employed by Raytheon Service Co., Burlington, Mass. . . . DONALD W. BEAN, corporate products manager of Jamesbury Corp., Worcester, was the author of the article "How to Select High-Performance Valves," which appeared in the February issue of *Chemical Engineering*. . . . WILLIAM S. BROWER JR. is currently director of operations for Electrodyne Co., Division of Becton Dickinson & Co., Sharon, Mass. . . . JOSEPH L. CHENAIL has been appointed vice president, marketing and sales, by Microsystems International Ltd., in Canada. He joined the company in 1970 and served as director, market and sales. Currently he is located at the Ottawa Center. Previously he was with Sprague Electric Co., Worcester, where he was director of international marketing sales. . . . JAMES A. CHRISTO has joined Corrugated Paper Corp., Westboro, Mass. . . . DR. DAVID CRIMMINS recently gave a talk entitled "Spare Parts for People" at a meeting of The Lehigh Valley Chapter of the American Society for Metals which was held at Lehigh University in Pennsylvania. His talk focused on the application of metallic materials to replace degraded biostructures. . . . PAUL M. DALTON has been appointed vice president for engineering in New England for the Boston based national real estate development firm, Cabot, Cabot & Forbes. He will be responsible for all engineering aspects of the company's industrial park developments in New England. Previously he was manager of the site engineering department. He has been with CC&F since 1965. . . . PETER C. DIRKSEN, JR., director of industrial development for Commonwealth Gas Corporation, Worcester, spoke about the total energy concept at a recent meeting of the West Springfield [Mass.] Rotary Club. He is a registered engineer and a Westboro selectman. . . . JOHN A. FADO is marketing manager at Tratec, Inc., Century City, Calif. . . . MARIAN C. KNIGHT serves as an engineering specialist with Sylvania GTE, Needham Heights, Mass. . . . EDWARD J. KRESS works for Fairfax Corp., Worcester. . . . BRADLEY J. MCKENZIE is associated with Masonellan International, Inc., subsidiary of Studebaker-Worthington, Inc., Norwood, Mass. . . . ROBERT B. MULEOD has joined Raytheon Corp., Bedford, Mass. . . . HOWARD O. PAINTER is with General Radio Co., Concord, Mass. . . . KENNETH J. ROME recently opened his own law practice on Madison Avenue in New York City. . . . CARL A. STRAND works as plant manager at Beadazzled, Oakland, Calif. . . . Simplatrol Products, division of Formsprag Co., Auburn, Mass., employs ALADAR SZEIDLER, SIM. . . . TENNYSON T. WANG is with TRW Systems, operating group of TRW, Inc., Redondo Beach, Calif. . . . J. CLIFFORD WIERSMA is a self-employed small business consultant in Indianapolis, Indiana. . . . PETER J. ZANINI, JR., works for Tech Systems Corp., Thomaston, Conn.

1959

DR. PAUL A. BONCZYK is a senior research scientist with United Aircraft Research Labs, East Hartford, Conn. . . . FREDERICK J. COSTELLO has been named the new marketing manager for chemicals of Union Carbide Corporation marketed to manufacturers of personal care, detergent, chemical-specialty, and refrigerant products. He will direct long and short range market planning for the products and services which the company provides for those producers. Since joining the company in 1959, Costello has served in various sales capacities. Prior to his present post, he was sales manager for the same chemical group. . . . MORGAN S. ELY, who received his MBA from Utah State University last year and his MSCE in Water Resources from Utah this year, works as a senior civil engineer in the Department of Environmental Protection, State of Connecticut, in Hartford. . . . ANTHONY E. ENGSTROM has joined Grubb & Ellis Co., San Rafael, Calif., as a salesman. . . . GEORGE M. FOTIADES is with GTE Sylvania in Needham Heights, Mass. . . . ARTHUR HALPRIN is at the University of Delaware in Newark. . . . ROBERT W. HOAG serves as a senior project engineer with Texas Instruments, Attleboro, Mass. Bob and his wife, Mary, recently returned from a combination business and pleasure trip to Europe where they visited Paris, Amsterdam, and London.

PHILIP F. RAMSEY has been named chief accountant in the Massachusetts State Department of Mental Health. It is his responsibility to supervise federal reimbursement programs of the mental health department and its facilities throughout the state. . . . GEORGE SCHREINER JR. has joined Raytheon Co., Sudbury, Mass. . . . PAUL E. SIEGMUND, SIM, was recently promoted to Lens Plant production manager in the Optical Products Division of American Optical Corporation, Southbridge, Mass. He will be responsible for the Executive (R), Masterpiece (R), Fused Multifocal and Trials-Lenticular Production Departments. Previously he served as production manager of the grinding shop, as well as holding other managerial positions. He has been with the company 31 years. . . . RONALD F. SWENSON and his family have moved to Gloucester, England, where he is starting a two-year assignment as information systems manager-manufacturing group, for Rank-Xerox. . . . ROBERT D. TAFT, SIM, is employed as a scheduler at Morgan Construction Co., Worcester.

1960

DR. ROBERT A. CONDRATE, associate professor of spectroscopy at the New York State College of Ceramics at Alfred University, has been selected for inclusion in the 1973 edition of International Scholars Directory, a standard reference published in Strasbourg, France. . . . HARRY F. Di ZOGLIO is a consulting engineer (Harry F. Di Zoglio, P.E.) in Foster, R.I. . . . PAUL J. DOYLE, JR., has joined AMRL, Watertown, Mass. . . . FRANK A. DROMS, JR., is assistant manager operational audit at LTV Electrosystems, Inc., Dallas, Texas. . . . EARL G. ERICKSON works as an equipment engineer for Warner & Swasey Co., Worcester. . . . WILLIAM J. FIRLA, JR., a systems engineer for IBM, is currently working in Croydon, England. . . . DAVID B. HALEY has employment with Squier & Co., Monson, Mass. . . . WILLIAM A. KERR holds the post of chief of structural analysis at Pratt & Whitney Aircraft, East Hartford, Conn. . . . JOHN F. KIRKPATRICK is with Blue Cross-Blue Shield, Concord, N.H.

ARTHUR J. LoVETERE has been appointed marketing manager for all domestic areas at MacDermid Incorporated, Waterbury, Conn. His responsibilities will be the direction of sales, product management, sales promotion, and advertising. He has been with the company since 1957. Prior to his promotion, he was technical sales representative, Philadelphia, Pa., and regional sales manager for the northeastern region. . . . NORMAN B. MACK is president of Consumer Industries, Inc., Little Neck, N.Y. . . . LEONARD G. MARCOTTE works as a manager for C&W Fabrications, Inc., Gardner, Mass. . . . BERNARD F. McKERNAN, JR., was re-elected in March to a new three-year term on the school committee in West Boylston, Mass. Last year he served as chairman of the committee. McKernan is vice president of Waldon Construction, Inc., Acton, Mass., and is president of Wilmac Co., Inc., a newly formed development corporation. . . . Presently Major ROBERT B. MULHOLLAND, JR., serves as a contracting officer for the U.S. Army Electronics Command in Philadelphia, Pa.

Currently MICHAEL J. O'TOOLE, JR., is chief, intergovernmental group, for the New York State Department of Environmental Conservation. . . . ANAN PANANANDA serves in the Investigation Division, Department of Customs, Ministry of Finance, Klongtoey, Bangkok, Thailand. . . . HARRY F. RAY is technical services and distribution department superintendent at Monsanto Company, Bridgeport, N.J. . . . Major LEONARD S. STRZELECKI serves as executive officer with the 19th Maintenance Battalion, U.S. Army. He resides in Giessen, Germany. . . . DONALD A. TAYLOR is project superintendent at Catalytic, Inc., Joliet, Ill. . . . ELBERT K. WEAVER works as a metallurgist for Wyman Gordon Co., North Grafton, Mass.

1961

FRANCIS A. CICHOWSKI is supervisor at General Electric, Plainville, Conn. . . . ROBERT C. CRAWFORD works for E.E.T., Inc., Scituate, Mass. . . . DAVID W. CUFF is a project engineer, research and development, at Cumberland Engineering Co., Providence, R.I. . . . ROBERT M. FITCH is currently employed by Boston Insulated Wire, Dorchester, Mass. . . . DR. JAY A. FOX has been chosen as a nominee for the Commanding Officer's Scientific Achievement Award by the Military Technology Department at the Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. He was a member of a two-man team recommended for the scientific award on the basis of their outstanding research in the complex phenomena of spallation in materials when caused by short pulse laser radiation and hypervelocity projectile impact. Their achievements have significantly advanced the state-of-the-art in the spallation area and have highlighted the potential military applications of the spallation phenomena. . . . PRESTON W. HALL, SIM, has been appointed division manager of the Knife Division of Rexnord, Inc., with plants in Maynard and Ottumwa, Iowa. He was formerly president and general manager of Hobbs Mfg. Co., Worcester, a subsidiary of Crompton & Knowles Corp. He is past president of the Society for Advancement of Management.

ROBERT P. HEDLUND teaches at Doherty Memorial High School, Worcester. . . . DR. PETER A. HURWITZ is a chemist at Natick Army Labs, Natick, Mass. . . . JOHN W. JOHNSON, SIM, works for Warner & Swasey, Worcester. . . . HAROLD L. JURIST is manager of specials engineering for IBM Corp., Manassas, Va. . . . Presently CHARLES R. LEHTINEN serves as a senior engineer at The Boeing Co., Seattle, Washington. . . . MALCOLM E. LOW has started his own company, Hitec Corp., in Gloucester, Mass. . . . FRANK MARRA has joined Four-Phase System, Wakefield, Mass. . . . DAVID L. ST. ONGE now works for Riley Stoker Corp., Worcester.

Fox '61

Simmon '62

1962

National Cash Register Co., Dayton, Ohio, employs EDWARD B. ALLEN, JR., as a product requirements analyst. . . . ALBERT C. ANDREWS is manager-production control for the range department at General Electric in Columbia, Md. . . . GEORGE F. BASTIEN works as an engineering supervisor at Bechtel Power Corp., Gaithersburg, Md. . . . DR. KEYREN H. COTTER has been appointed president of Del Research Corp., Hellertown, Pa. Formerly he was a staff member of the Aeronautical Systems Division of the U.S. Air Force on assignment to the C-5-A Galaxy aircraft independent structural review team at the Lockheed-Georgia Co. Earlier he held positions at the Lockheed-California Co., and the North American Rockwell Corp. . . . ROBERT E. DARGIE, SIM, has been named engineering manager in the AO Contact Lens Division of the American Optical Corporation, Southbridge, Mass. He will be responsible for the planning and development of new technologies related to the manufacturing of soft contact lenses. He joined the company 17 years ago. Formerly he was manager, optical process technology.

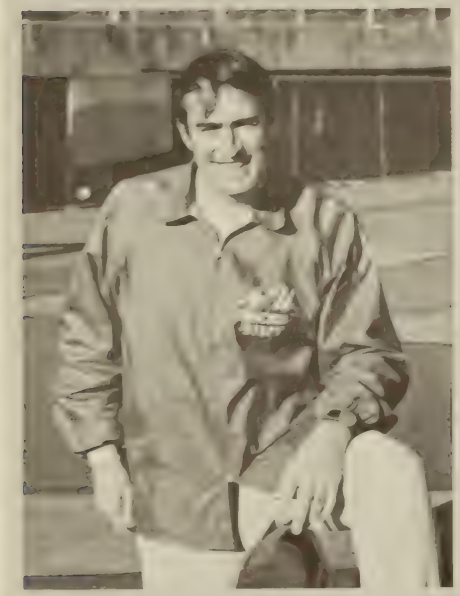
ANDREW M. EDELMAN is an actuary with Kwasha Lipton, Inc., Englewood Cliffs, N.J. . . . GEORGE H. FORSBERG, who received his MBA from the University of West Florida last year, now works as a senior engineer at Monsanto Textiles Co., Decatur, Ala. . . . PAUL F. GELINAS is with Tack Band, Inc., Fitchburg, Mass. . . . JOEL L. GORDON holds the position of special assistant to the Secretary of Natural Resources in San Juan, Puerto Rico. . . . Presently ROBERT H. GORETTI is manufacturing engineering supervisor at Texas Instruments, Inc., Attleboro, Mass. . . . WALTER W. LUIKEY is president of Hi Standard Engineering, Wilmington, Mass. . . . DR. ROBERT E. McINTOSH, JR., was recently promoted to the rank of professor at the University of Massachusetts. In 1967 he joined the department of electrical and computer engineering as an assistant professor. He became an associate professor in 1970. Previously he was a member of the technical staff at Bell Telephone Laboratories, Inc., North Andover, Mass.

JAMES P. PAQUETTE serves as plant manager for Sterling Container Corp., Manchaug, Mass. . . . RICHARD A. SCOTT works for Wiltek, Inc., Wilton, Conn. . . . BRUCE A. SIMMON has been named to a new position as market planner with the Dresser Industries tool group, in Chicago. Previously he served as manager, market statistics, with Bay State Abrasives, a division of Dresser Industries, Inc., Westboro, Mass. . . . STANLEY J. STRYCHAZ holds the post of district manager for General Appraisal of Canada in Toronto, Ontario. . . . DR. JOHN K. TIEN, speaking before the American Society for Metals, said that safety cars that can protect a driver in a 50-mile-per-hour crash into a solid object will be available to the public by the 1980's. Dr. Tien, a professor of metallurgy at Columbia University, is head of a Sloan Foundation project on safety vehicles. . . . ROBERT P. WILDER works as a marketing representative for IBM, Waltham, Mass. . . . ROBERT H. YORK is a senior engineer at Harlan Engineers, San Francisco, Calif.

1963

Capt. RICHARD B. ALLEN, commander of headquarters company at Fort Detrick, Md., has been assigned to graduate study at Tulane University in the field of atomic physics. He is the only non-West Pointer assigned for this advanced study. . . . JOSEPH V. BEAULAC serves as a senior engineer at Raytheon Company, Wayland, Mass. . . . RICHARD T. DANN is assistant editor of *Machine Design Magazine*, Cleveland, Ohio. . . . CHARLES R. ELFREICH is town engineer for the Town of Mamaroneck, N.Y. . . . ROBERT C. ELWELL works for Grumman Aerospace, Bethpage, N.Y. . . .

Good Luck, Coach!



If the University of Nebraska continues its winning ways on the gridiron (Orange Bowl Champions 1971-73), much of the credit can be given to Frederick "Rick" Duval, '61, the new linebacker coach and director of recruiting at the University.

Duval arrived at Lincoln after a rewarding five-year stint as receiver-quarterback coach and director of recruiting at the University of Colorado in Boulder. Colorado was victorious in the Liberty Bowls in '69 and '70; in the Bluebonnet Bowl in '71; and in 1972 lost to Auburn in the Gator Bowl. The University ranked in the top ten in 1972 and was number three in 1971.

This was Duval's first spring to recruit at Nebraska and evidently the know-how he picked up while at Colorado is already standing him in good stead. He got the men he wanted. Coach Tom Osborne went so far as to say that "this is the best year Nebraska ever had in recruiting."

How did a soft-spoken electrical engineer from WPI get into the upper echelons of Big-8 football? "I guess it just happened naturally," Duval says. "I was always interested in sports. As a teenager I was a quarterback and enjoyed playing football at Middletown (Conn.) High School."

While at WPI he played four years on the varsity eleven. Three of those four years he was Tech's signal-caller and passer. Not content with earning his "W" in football, he also garnered another in baseball and captained the 1961 team. He played basketball, joined the Varsity Club, and worked as a make-up editor on the *Tech News*. To round things out he became a member of the Tech Senate, joined Phi Kappa Theta, and was voted vice president of the sophomore class. By the time he was a senior, Rick Duval had called quite a few changes both on and off the playing field. He called them so well he was listed in "Who's Who."

He had also done some listening—to Coaches Bob Pritchard and Charlie McNulty, both of whom he credits with furthering his interest in coaching as a career.

Following graduation he was named assistant football and head basketball coach as well as mathematics department chairman at Milford (Mass.) High School, a post which he held for a year before entering graduate school at Wesleyan University. In 1964 he received his MA in mathematics from Wesleyan. During the 1964-65 season he was head football and wrestling coach and physics department chairman at Bristol (Conn.) Eastern High School.

The next year he moved up into collegiate circles as defensive secondary coach at Central Connecticut State College where his career really began to take off. Connecticut earned national ranking in the small college division for pass interceptions (31) and racked up a 9 won, 1 lost record.

At Columbia University (1966-68) Duval became defensive secondary coach, defensive coordinator and director of football recruiting. Columbia ranked seventh nationally in pass defense in the major college division while he was on staff.

Then came the successful five-year hitch at Colorado and his equally successful '73 spring recruiting at his new post in Nebraska. If history repeats itself, it looks as though Rick Duval may well have more champions in his future.

LESLIE J. HART is a patent attorney with Russell & Nields, Boston. . . . FRANCIS E. KENNEDY, JR. is spending several months as a visiting researcher at the Polytechnic Institute of Bucharest, Romania. He received his PhD in mechanics at RPI in December and is doing research in that field while abroad.

WILLIAM J. LADROGA, JR., manager of the metallurgy laboratory for Arnold Greene Testing Laboratories in Natick, Mass., recently won "the award of merit" from the company for quality contributions. . . . Major BRYAN V. LECLAIR has been selected to attend the Army Command and General Staff College, Fort Leavenworth, Kansas. He has been a full-time student at the University of Alabama under the Army's advanced degree program. He has earned his master's in engineering and has completed the course requirements for the PhD in electrical engineering. Formerly he commanded the Aviation Electronics Support Co. in Vietnam and the 51st Signal Battalion in Korea. He was awarded the Meritorious Service Medal, a Meritorious Unit Commendation Medal, a Bronze Star, the Air Medal, and the Army Commendation Medal. . . . DANIEL J. LIZDAS currently serves as project manager at Hamilton Standard, Windsor Locks, Conn.

JAMES W. McKENZIE is with Guardian Health Co., Emeryville, Calif. . . . ALFRED A. MOLINARI has been elected vice president for marketing at Analogic Corporation. . . . PETER Y. ONG works for TWA in New York City. . . . ARTHUR T. PHILLIPS, SIM, is with Penn Oil, Boston. . . . EDWARD J. POLEWARCZYK, engineering services manager at Dynamic Controls Corp., South Windsor, Conn., recently received his MBA from American International College School of Business Administration, Springfield, Mass. He participated in the college's three-year executive development program. . . . DR. WILLIAM J. SAVOLA, JR., is a security analyst at Cowen & Co., New York City. . . . NISHAN TESHOIAN currently serves as manager of manufacturing administration at General Electric Co., Erie, Pa.

1964

Married: TERRY A. BRIGGS to Miss Stella A. Sullivan on May 5, 1973 in Brattleboro, Vermont. Mrs. Briggs holds a BS in electrical engineering from Northeastern University, Boston. Both she and her husband are employed at Naval Underwater Systems Center in New London, Conn. . . . JOHN D. CAMERA, JR. and Miss Anne Marie Boyle in Quincy, Massachusetts, on May 5, 1973. WILLIAM F. SHIELDS, '65, was best man and VICTOR MARONI, '64, was an usher. The bride, a graduate of Massachusetts Bay Community College, is a flight attendant with Eastern Airlines. Camera is a construction engineer with Camera Construction Co.

Born: To Mr. and Mrs. THOMAS S. BARON, a daughter, Christine Frances, on July 24, 1972. Tom was recently promoted to senior civil engineer with the Metropolitan District Commission in Boston.

DR. KENNETH D. ALLARD is employed at Technical University, Clausthal, Germany. . . . DR. PAUL G. AMAZEEN serves as an engineering manager for Raytheon Co., Medical Electronics, Waltham, Mass. . . . RALPH F. BEDFORD is a graduate student at Midwest Business School, Colorado Springs, Colo. . . . FRANCIS X. CARADONNA works for Ames Research, Moffettfield, Calif. . . . WILLIAM A. COTE has been promoted to senior project engineer at TRC, The Research Corporation of New England, Wethersfield, Conn. Presently he is directing TRC's research study of indoor versus outdoor air pollution for the U.S. Environmental Protection Agency. Cote has published a number of articles in technical journals including one on "Grain Dust Emissions." . . . MILTON P. DENTCH works for Polaroid Corp., Waltham, Mass. . . . WILLIAM J. DOWD holds the post of manager-capital expenditures, Heublein, Inc., Hartford, Conn. . . . WILLIAM E. FERGUSON teaches chemistry at Rhode Island Junior College in Warwick. Last year he received his PhD from the University of Rhode Island. During the summer he serves as assistant director of the Gordon Research Conferences in New Hampshire.

ROBERT L. GARRISON is president of Garrison Machine & Instrument Co., Henniker, N.H. . . . In January BRUCE M. JUHOLA accepted a position as eastern regional sales manager for Raychem Corporation, Menlo Park, Calif. He is currently located in Hingham, Mass. . . . JAMES C. KNUDSON is with the State of Washington Department of Ecology in Olympia. . . . RONALD E. LUBOWICZ has received his degree from the University of Denver College

of Law. . . . THOMAS J. MODZELEWSKI serves as a systems engineer for Leeds & Northrup in Denver, Colorado. . . . ROBERT H. MORSE now works for Traffic Systems Co., Inc., Clinton, Mass. . . . DR. MYRON G. MYERS is a senior associate at Systan, Inc., Washington, D.C. . . . BRUCE A. OCHIEANO holds the position of controller for Fireside Securities Corp., Redwood City, Calif. . . . DR. ROBERT A. PEURA has been promoted from assistant professor to associate professor in the Electrical Engineering and Life Sciences Department at WPI. . . . LEO PLUSWICK is with ECAC, Annapolis, Md. . . . PAUL J. SROKA presently works as a senior engineer at Raytheon Co., Goleta, Calif. . . . PETER J. TANCREDI has joined Camp Dresser & McKee, Boston. . . . Delaval Turbine, Inc., Trenton, N.J., employs ALBERT E. TRURAN, JR. . . . LOUIS A. WARGO is employed by City National Bank, Bridgeport, Conn.

1965

Married: JOSEPH GRACIA, JR. to Miss Gates in Ashland, Massachusetts on April 14, 1973. Mrs. Gracia is a special education teacher in North Attleboro, Mass. Mr. Gracia is a marketing product specialist at Cornell Dubilier Electric Corp., New Bedford, Mass.

Born: To Mr. and Mrs. GREGORY F. BERRY their second son, David Jared, on March 6, 1973. Berry recently received his PhD in applied mechanics from the University of Connecticut. Currently he is working for Argonne National Laboratory.

O. WILLIAM BJORNLUND, SIM, is a production engineering manager at Warner & Swasey, Worcester. . . . ROLLIN K. CORWIN works for HICOR, Houston, Tex. . . . J. KIRBY HOLCOMBE has been promoted to project engineer at TRC, The Research Corporation of New England, Wethersfield, Conn. As an environmental engineer, he has been responsible for environmental programs dealing with measurement and control of air and water pollution along with chemical industry solid waste management. Presently he is working in the marketing division at TRC. . . . RICHARD B. KENNEDY is a customer executive instructor at IBM Corporation Education Center, Poughkeepsie, N.Y. . . . DONALD G. MUNSON has joined United Engineers & Constructors, Boston. . . . EDWARD A. OBERMEYER now serves as technical manager at Kendall Company, Merced, Calif. . . . DAVID S. SAWICKI has been named assistant dean at the University of Wisconsin, Milwaukee.

CHESTER J. SERGEY, JR. has been promoted to the position of product manager at Enthone, Inc., West Haven, Conn. He will be responsible for coordination of all activities related to the marketing of part of the company's growing line of specialty chemicals for the plating and metal finishing industries. Formerly he represented Enthone in western Connecticut and eastern New York as district sales engineer. . . . WILLIAM F. SHIELDS now flies 727s out of Miami, Fla., for Eastern Airlines. . . . DENNIS J. SIMANAITIS works in the mathematics department at the College of Virgin Islands. . . . MARTIN P. SOJA is with Long Island Lighting Co., Hicksville, N.Y. . . . Currently KENNETH W. TERRY serves as a senior experimental engineer at Pratt & Whitney Aircraft, East Hartford, Conn. He is responsible for directing noise testing of all model jet noise test programs. Previously he was a research engineer at Electric Boat Division of General Dynamics Corporation, Groton, Conn. . . . Capt. JOHN G. ZYNER is now stationed at Hankway AFB, Bedford, Mass.

1966

Married: L. THOMAS BENOIT, JR. to Miss Pamela M. Gozzo on April 6, 1973 in Newington, Connecticut. STEPHEN J. HEBERT and RONALD F. NAVENTI served as ushers. Mrs. Benoit attended Central Connecticut State College and is employed by The Greater Hartford Process, Inc. The bridegroom is with Flame Treating and Engineering, West Hartford, Conn.

Born: To Mr. and Mrs. WILLIAM F. ELLIOTT, a daughter, Jennifer, on August 19, 1972. Bill is director of admissions at Carnegie-Mellon University, Pittsburgh, Pa.

EDWARD F. ADAMCZYK has joined Alpha Industries, Inc., Woburn (Mass.) as a sales engineer for the company's Semiconductor Division. He will be selling discrete semiconductor devices to original equipment manufacturers throughout the country. Formerly he was with Corning Glass Co., Phoenix, Ariz., where he was a product engineering supervisor. . . . DR. AHMET K. ATAKAN is a lector in Bogazigi University's physics department, Istanbul, Turkey. . . . EDWARD S. BILZERIAN, SIM, has been appointed division controller for the Bay State Abrasives Division, Westboro (Mass.) of Dresser Industries, Inc. He joined the company in 1955 and had been controller with responsibility for the Westboro operation. Now he will have responsibility of Bay State and its subsidiaries. . . . THOMAS P. BRASISKIS works as a sales engineer for Becker & Goldstein, Norwich, Conn. . . . GERARD G. CHAREST, JR., is sales engineer at Tibbetts Engineering, New Bedford, Mass. . . . WILLIAM V. COLLENTRO works for Stone & Webster, Boston.

Capt. EUGENE R. DIONNE participated in the U.S. Air Force worldwide ski meet held last winter at Snow Basin, near Hill AFB, Utah. More than 100 of the finest skiers from 46 Air Force bases competed in the five-day meet. . . . JAMES M. FIFE is employed by McMillan Equipment, Houston, Texas. . . . JOHN KOPCHIK, JR. is superintendent of raw materials coordination for Samsonite Corp., Denver, Colo. . . . DARREL J. KOST works as an assistant civil engineer for the State of New York, Babylon, N.Y. . . . HARRY B. OGASIAN is a senior electronics engineer for Kollmorgen Corp., Northampton, Mass. . . . Presently RICHARD J. PANKOSKI is a marketing representative with Hazeltine Corporation, Denver, Colo. . . . JONATHAN H. PARDEE serves as a financial analyst in the plastics department of Dupont Co., Wilmington, Delaware. . . . RONALD F. PICHIERRI is a senior engineer for Applied Display Services, Inc., Wayland, Mass.

CHARLES C. ROBERTS, JR., who recently received his PhD in mechanical engineering from the University of New Mexico, also holds another distinction. He was named as one of the "Outstanding Young Men of America" in 1970. After receiving his BS and MS in mechanical engineering from WPI, he went on to the University of Arizona in Tucson to take courses in reliability testing and later studied for his PhD at the University of New Mexico.

During the past seven years he has worked in the R&D Department at Jamesbury Corporation, Worcester; served as a mechanical engineer (1/Lt.) with the U.S. Army Materiel Command, Yuma (Ariz.) Proving Ground where he developed new designs for solar radiation shielding for environmentation; become the author of twelve publications; and given five presentations including "Automobile Emissions in Albuquerque" which took place at Environmental Hearings at City Hall in Albuquerque, N.M., in 1971. He also taught at WPI, Arizona Western College in Yuma, and at the University of New Mexico.

Among his memberships and clubs are ASME, National Society of Pershing Rifles, Nautical Association, National Figure Skating Association, and Sigma Tau.

Currently he is with the Toll ESS Design Department, Bell Laboratories, Naperville, Ill.

ASHOK D. SHAH has joined Western Concrete Structures, Gardena, Calif. . . . JOHN M. SMITH presently works as a mechanical engineer at Riley Stoker Corp., Worcester. . . . Microwave Assoc., Inc., Burlington, Mass., employs DR. ALLEN A. SWEET. . . . MALCOLM C. WHITE, JR., is a self-employed builder in South Harwich, Mass. . . . ROGER J. ZIPFEL now serves as a supervisor with E.I. du Pont, Ingleside, Texas.

1967

Married: ALAN L. JANKOT to Miss Pamela Galvin last winter in East Hartford, Connecticut. The bride is a graduate of Fisher Junior College, Boston. Her husband, a design engineer for Pratt and Whitney Aircraft, East Hartford, Conn., is currently working on a special assignment for the company in Sweden. . . . PAUL G. TRUDEL and Miss Jean Webster in Pylesville, Maryland on February 3, 1973. Mrs. Trudel was a teacher. Her husband was recently discharged as a lieutenant from the U.S. Navy where he was assistant director of the Enlisted Department at the Naval Nuclear Power School, Bainbridge, Md. Presently he is a senior engineer with Bechtel Power Corporation, Los Angeles, Calif. . . . WARREN B. ZEPP, JR. and Miss Ellen A. Freeman in Brimfield, Massachusetts on April 7, 1973. The bride, a graduate of Clark University, is a biochemist. The groom is an environmental biologist with New England Research, Inc., Worcester.

Born: To Mr. and Mrs. JOHN KILGUSS, a son, Daniel Eric, on May 12, 1973.

Currently EUGENE J. BALDRATE is a captain with the U.S. Air Force at McClellan AFB, Calif. He received his MBA from the University of California at Sacramento last year. . . . PATRICK T. BUTLER serves as a mechanical engineer at the U.S. Air Force Rocket Lab., Edwards AFB, Edwards, Calif. . . . CURTIS R. CARLSON works in acousto-optics for the RCA/David Sarnoff Research Center, Princeton, N.J. Recently he received his PhD from Rutgers University. . . . WAYNE M. CHIAPPERINI has been hired as a full-time engineer by the Water and Sewer Commission of Waterford, Conn. Formerly he was a sanitary-civil engineer at Fram Corp. in Rhode Island. He has also served as assistant town engineer in North Haven. Earlier he was a nuclear project engineer at General Dynamics-Electric Boat in Groton, Conn. The May issue of *American City* includes an article he wrote about his work in North Haven.

DANIEL I. COIFMAN is a production manager at Interpak Corp., San Juan, Puerto Rico. . . . STEPHEN B. COTTER now works as a 727 pilot for Eastern Airlines out of Miami, Fla. . . . ROBERT E. DeNIGRIS is a teacher and cofounder of New Independent High School, a free school in New London, Conn. . . . PETER J. DICKERSON holds the post of project engineer at Esso Research & Engineering Co., Florham Park, N.J. . . . JOHN P. DOW serves as a sales engineer with Air Products & Chemicals, Inc., Framingham, Mass. . . . DAVID C. DRESCHER works for Sanders Assoc., Inc., Nashua, N.H. . . . WAYNE C. GARTH is with IBM Corp., Thousand Oaks, Calif. . . . ROBERT E. GOHSLER has been employed as a systems analyst for IBM, Hartford, Conn. . . . GREGORY J. GOULET works for Country Village Real Estate, Merrimack, N.H. . . . FRANK T. JODAITIS has joined HUD, Hartford, Conn. . . . MATHEOS S. KALFAYAN is employed by Armaco Overseas Company at the Hague, Netherlands. . . . LAWRENCE E. NELSON is a planning director for the Allegany County Planning & Zoning Commission, Cumberland, Md

Huntington Co., Fairfield, Conn., employs RONALD J. OCHMAN. . . . SHANTIKUMAR V. PATEL is with DMJM, Washington, D.C.

CHARLES F. PROCTOR is a marine turbine project engineer for Avco, Lycoming Division, Stratford, Conn. . . . BRUCE F. ROGERS, JR., a captain in the U.S. Army, presently attends Tulane University as a graduate student in the business school. . . . CARL R. SCHENKER has joined the technical staff at Mitre Corp., Bedford, Mass. . . . Brunswick Corp., Milford, Conn., employs ROBERT P. TOLOKAN. . . . MAHESH M. VYAS presented a technical paper, "Increasing Hot Strip Mill Roll Life by Spray Lubrication," at the annual convention of the Association of Iron and Steel Engineers held in April in Chicago. He is with the mill equipment and control section of Homer Research Laboratories, Bethlehem Steel Corp., Bethlehem, Pa.

Like to keep in touch with the WPI student scene?

Subscribe to the WPI NEWSPEAK (you used to know it as the TECH NEWS). $4.50 per year.

Write the business manager, WPI Newspeak, WPI Worcester, Mass. 01609

1968

Married: DONALD R. BERGSTROM to Miss Sandra Twaite on January 1, 1973. The bridegroom is with Dufresne & Henry Engineering. . . . WALTER C. LYNICK and Miss Mary Anne Piccirillo on April 7, 1973 in Troy, New York. ISRAEL MAC was an usher. The bride and groom are both with the New York State Department of Transportation in Albany. . . . E. WAYNE TURNBLOM and Miss Pamela Kay Rider on March 17, 1973 in Rochester, New York. DANIEL A. LIPCAN, '69, was best man. Mrs. Turnblom, a graduate of Elmira College, was formerly an admissions assistant in the chemistry department at Columbia University. Dr. Turnblom is a chemistry instructor at Princeton University.

KENNETH A. CRAWFORD currently serves as a graduate research assistant at Alden Research Laboratories, Holden, Mass. . . . MARSHALL J. DANA is a test engineer at United Technology Center, Sunnyvale, Calif. . . . JEFFREY A. DECKER has received his Master's Degree in business administration from Babson College, Babson Park, Mass. . . . MARK A. FREYERMUTH is a student at the University of Massachusetts in Amherst. . . . MICHAEL T. GLYNN is employed by Instrumentation Lab., Inc., Lexington, Mass. . . . DAVID J. GUMBLEY works as a project engineer for Campanella Corp., Warwick, R.I. . . . ROBERT D. HICKEY serves as a programming analyst at Honeywell Information Systems, Phoenix, Ariz. . . . ROBERT J. HORANSKY is assistant engineer-computer applications, at Northeast Utilities Service Co., Hartford, Conn.

RAFIK E. KATHIWALLA works as a land investment consultant at ANTEC, Santa Clara, Calif. . . . WILLIAM J. KRIKORIAN is a senior civil engineer for the Massachusetts Bureau of Building Construction in Boston. . . . EDWARD C. McNAMARA holds the position of president of Mole Industries, Inc., a contracting, remodeling, and rental firm in Worcester. . . . WAYNE L. PIERCE is a senior project engineer at Esso Research & Engineering Co., Baton Rouge, La. . . . ANDREW L. PIRETTI is a mortgage banker and construction loan officer at Wachovia Mortgage Co., Atlanta, Ga. . . . FREDERICK F. REED is employed as a staff engineer for the GTE Sylvania, Inc., CATV Operation in El Paso, Texas. . . . JOEL S. SHOENHOLTZ has joined Customs Chemicals, East Paterson, N.J. . . . ROGER P. SEPSO is employed by Robert-Shaw Controls, Milford, Conn. . . . WILLIAM P. STANTON is with Maorcan Engineering, Delta, Colo. . . . CARL P. STEELE works for Bird & Son, Inc., East Walpole, Mass. . . . LOUIS STRONG is a doctoral candidate at the University of Michigan in Ann Arbor. . . . DAVID C. WILLIAMSON serves as an assistant engineer at Sperry Rand Corp., Sperry Systems Management Division, Great Neck, N.Y.

1969

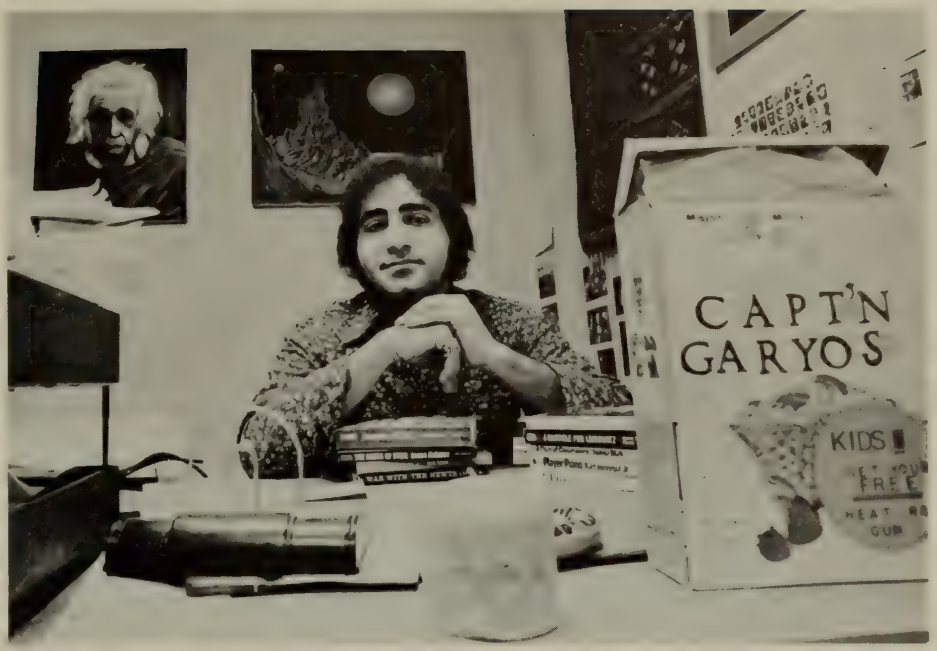
Married: GARY A. SMITH to Miss Suzanne E. Phelps on January 20, 1973 in Elnora, New York. The bride is a graduate of Becker Junior College. . . . PHILLIP R. WILSEY, JR. and Miss Marilyn F. Burnes on April 6, 1973 in Hartford, Connecticut. Mrs. Wilsey graduated from Emmanuel College, Boston. Her husband is with Pratt & Whitney Aircraft, East Hartford.

Born: To Mr. and Mrs. STEPHEN R. PHILLIPS their first child, Leah Kimberly, on April 12, 1973.

DENNIS G. AGIN is a systems analyst with Raytheon Co., Federal Aviation Administration, Atlantic, N.J. . . . JAMES A. ALFORD works as an erection machinist with Central Rigging, Avon, Conn. . . . Capt. WARREN L. ANDERSON is a pilot and aircraft commander with the U.S. Air Force. Currently he is at Yokota AB, Japan. . . . JAMES P. ATKINSON is a graduate student in the department of community planning at the University of Rhode Island. . . . RAYMOND H. BARROWS, JR., holds the post of project engineer with Finch, Pruyn & Co., Inc., Glens Falls, N.Y. . . . JOEL I. CEHN writes that he has received his MS degree in nuclear engineering from North Carolina State University. Recently he completed a trip through the U.S. and Mexico. Last November one of his articles was published in *Nuclear Technology*. At the present time he is a radiological scientist at Boston Edison Co., Boston. . . . ANTHONY J. CRISPINO now works as a computational physicist at Physics International, San Leandro, Calif.

LAWRENCE E. DAY has joined Boeing Co., Seattle, Washington. . . . RALPH J. ESCHBORN II is a technical supervisor with E.I. du Pont de Nemours & Co., Antioch, Calif. . . . Presently STEPHEN D. FISCHER is a corporate product safety manager with Hewlett-Packard Co., Palo Alto, Calif. . . .

Gosh kids---Its Captain Gary Time



So, the kids watch Saturday morning TV and you're up to your cowlick with Josie and the Pussycats in Outer Space, Sealab 2020, and the sixty-seventh rerun of The Jetsons. Not educational, you say. Junk. All that science fiction stuff will never get them anything, except, maybe, trouble.

And then there are the comics. Cover-boy Superman, muscles flexed, smiles at you smugly from atop the coffee table. Hastily you flip him face down. Better yet, you stuff him, smile and all, beneath the sofa. You sigh. Between the TV shows, the funny books, and, of course, the drive-in double features (Remember The Blob and Fantastic Voyage?), the kids will never make it in the real world. Too bad. Gosh!

Some twenty years ago Mrs. Goshgarian felt just that way about her son, Gary. He read reams of science fiction. His head was inevitably in outer space. It still is. But nobody worries much about it anymore. You see, he gets paid for having his head out there.

DR. GARY GOSHGARIAN, '64, does what lots of 9-to-5 people can only dream about. He lives science fiction. He even wears a space suit. Sometimes. He hasn't admitted to owning a flying saucer, but somehow, every day he manages to get to Northeastern University in Boston. There, right there in the (Intellectual) Hub of the Universe Dr. Goshgarian is packing them into a most unusual but bona fide English course called "Captain Gary's Lonely Space Club."

Two hundred and fifty students take the course for credit every quarter. (That "Lonely" has got to be deleted from the title!) And they love the subject matter. Which is? What else? Science fiction, outer space, and little green men.

Each class starts out in a light-hearted Howdy Doody manner with the good captain yelling, "Hey, kids, what time is it?", with the class yelling back in return, "It's Captain Gary Time." Naturally the "program" is sponsored by a sugar-frosted cereal called Capt'n Garyos. It must be because somebody in the class announces just that and besides there's a box on the professor's desk that has Capt'n Garyos printed boldly across the front.

The levity ceases long enough for Goshgarian to pass out a reading list to his students that says, "Captain Gary welcomes you onto this all-too brief oasis amidst the desert of your educational experience. But since our oasis is unfortunately on this sorry planet, and since the planet may self-destruct at any moment, read the following yummy stuff, in the order given, as quickly as possible. Your performance in our little journey from the inner mind to the outer limits will, alas, be determined by a mid-term and a final exam and an optional paper. Your paper can be either a critical analysis of SF stuff, or an original short story, novel, play, poetry, or anything else that you probably can't buy from the good folks at Term Papers Unlimited."

The students settle down. They're going to have to do some work for their four hours' credit. They're going to have to learn (with the help of the good Captain) how to weed out the good science fiction from the bad. And they're going to have to show some imagination and originality.

"Captain Gary's Lonely Space Club" is certainly no run-of-the-mill English course, even though the students have standards to meet. It was instituted at Northeastern by Goshgarian in 1970 to liven up the curriculum and to attract students who weren't English majors. The class started out with 40 students and now gets about a quarter of the total enrollment in upper class English Department courses.

Science fiction is not only popular at Northeastern, which has, reportedly, the largest classes of its kind in the country. Currently about 1000 science fiction courses are offered at high schools and colleges nationally. Is science fiction relevant today? Can studying it really help society? "Yes," Goshgarian replies emphatically. He says that science fiction expresses a sense of urgency about directions that the human race is taking. It makes us ask whether we are losing our souls to technology. It isn't escapist reading unless you consider stories about over-population, pollution, mass alienation, ultra violence, thermo-nuclear war, machine-dehumanization and political brainwashing escapism. It forces us to look at our problems.

Another plus, according to Goshgarian, is that science fiction can impart a sense of wonder and hope. This is exactly what one of his favorite novels does beautifully. The novel, *CHILDHOOD'S END*, by Arthur C. Clarke (co-author of the movie epic, 2001, A Space Odyssey) is a story of man's abandonment of material things and his evolution into a superior mind life. In it Clarke expresses a great hope and anticipation for the future of man as well as a sense of awe about universal mysteries. "This wonder is the essence of good science fiction," Goshgarian comments. "It's what I want my students to experience."

As a physics major at WPI, he "invented the white tornado" while working on his undergraduate thesis. He constructed a tornado model in a laboratory which helped him to prove that tornadoes start electrodynamically rather than aerodynamically, a fact which could conceivably lead to tornado prevention.

Although Goshgarian has always thought of himself as a tinkerer, he discovered that the laboratory life, which he tried out for three summers with Raytheon in Wayland, Mass., was simply not for him. "I don't have the personality for it," he admits. In the light of this discovery, he went on to get his Master's in English from the University of Connecticut in 1966 and his PhD in English from the University of Wisconsin in 1972. In 1968 he spent a year as an assistant professor of English at Western Michigan University in Kalamazoo while working on a doctoral thesis.

And now he's an assistant professor of English at Northeastern University, combining his scientific and literary background into what can only be described as a novel career. (No pun intended!) He also "rents" himself out as a guest lecturer on science fiction. To date he has spoken at the Museum of Science and various colleges, including a turn as a speaker for a WPI Intersession course. And he writes and edits. Recently he has come up with a science fiction anthology which is presently in the negotiating stage with a publisher and has written several movie and video tape scripts for industry and insurance companies. Currently he is working on a science fiction novel which he plans to finish this summer.

He's got it made. In spite of TV and the science fiction stories he cut his teeth on in childhood, he's got it made. So, moms and dads, quit worrying. Dr. Gary Goshgarian came through the outer space syndrome more or less unscathed. Put Superman back on the coffee table. Smile indulgently at The Jetsons and The Blob. Maybe, just maybe, they aren't evil mind-benders after all.—Gosh!

JEROME B. FLYNN, JR. is employed as an automotive representative at General Electric Co., Southfield, Mich. . . . WARREN F. FOLLETT starts work as a research assistant in September in the EE Department at WPI where he will be studying for his Master's Degree. . . . JAMES HEINRICH is now a field engineer at Elliott Co., Chicago, Ill. . . . DR. ROY C. JOHNSON, JR., serves as a senior consultant with Synercom Technology, Inc., Houston, Texas. He received his PhD from Rice University last year. . . . CURTIS S. KRUGER is a development engineer for Scott, U.S.A., Sun Valley, Idaho.

JOSEPH A. LANGONE is a boiler design engineer for Riley Stoker Corp., Worcester. . . . DANIEL A. LIPCAN works as a production control manager at Boston Insulated Wire and Cable, Boston. . . . GEORGE T. McCANDLESS, JR., is a programmer for Aetna Insurance Co., Hartford, Conn. . . . EDWARD A. MIERZEJEWSKI has joined Chase, Rosen & Wallace, Alexandria, Va., as a transportation systems planner. . . . MATTHEW T. NECLERIO works for Albany Medical Center, Albany, N.Y. . . . RICHARD H. PALM is with Digital Equipment Corp., Syracuse, N.Y. . . . DANIEL C. POND recently received his MS in electrical engineering from the Johns Hopkins University, Silver Spring, Md. . . . DAVID B. PRATT has joined Sigma Processing Systems, Waltham, Mass. . . . JAMES T. RODIER is now with Charles T. Main, Inc., Southeast Prudential Tower, Boston. . . . VINUBHAI J. SHAH is employed by Stone & Webster Engineering Corp., Boston. . . . MARK S. SIMPSON works for Merck & Co., Inc., Rahway, N.J. . . . Z. RONALD STELMAK serves as an account representative at A.B. Chance Co., Naugatuck, Conn. . . . RICHARD J. WEINER is with Control Data Corp., San Diego, Calif. . . . Whelan Associates, Middlefield, Conn., employs DONALD W. WHELAN.

1970

Married: GARRETT G. GRAHAM and Miss Karen V. Klosowski on May 19 in Norwood, Massachusetts. HOWARD NORCROSS was an usher. The bride teaches in the Medfield School System. The groom is employed by the Polaroid Corp. of Waltham. . . . JOHN S. KEENAN to Miss Ann Marie Kosciuszek February 17, 1973 in Spencer, Massachusetts. Best man for his brother was THOMAS A. KEENAN, '67. Ushers included another brother, PHILIP KEENAN, '62 and STEVEN C. WATSON, '71. Mrs. Keenan is a registered nurse. The groom recently received his MS in management from RPI and is now an industrial engineer at Connecticut Light & Power Co., Meriden, Conn. . . . FREDERICK M. RYMSHA and Miss Janet L. Clapp on March 31 in Marlboro, Massachusetts. Mrs. Rymsha is a dental hygienist. Her husband is employed at Winchester (Mass.) Hospital as a biomedical engineer.

Born: To Mr. and Mrs. WILLIAM G. HILLNER their first child, a daughter, Catherine, on April 14. Bill is a sales engineer with The Train Co. in Boston.

DR. GEORGE P. ALLENDORF, JR., has become manager of the Semi-Conductor Group, Microwave Assoc., Inc., Burlington, Mass. . . . STEPHEN E. BERNACKI works at MIT's Lincoln Laboratories in Lexington, Mass. . . . PETER J. BILLINGTON has been appointed regional supervisor of Sigma Pi Fraternity in New England. Currently he owns and operates The Bike Shop in Worcester. . . . ALAN S. BREITMAN is associated with State Mutual Life Assurance Co. of America, Worcester. . . . JAMES F. BROWN recently exhibited "art and artifacts" at the Holden Experiment Gallery, in Holden, Mass. His show explored ideas, objects, and stimuli that were factors in the creation of recent works. In theatrical terms he described his exhibition as a stage production. Brown, who has been associated with Unicorn Studios, has also studied and taught at the Worcester Art Museum. . . . STEPHEN G. DEGON is with Polaroid Corp., Norwood, Mass.

DWIGHT S. DICKERMAN is now a staff engineer for Linde Division of Union Carbide Corp., Indianapolis, Indiana. . . . RICHARD H. GOFF will shortly resume his work towards a Master's Degree in electrical engineering at the University of Vermont sponsored by his employer, the IBM Corporation, Essex Junction, Vt. . . . RONALD J. GRZELAK serves as a second lieutenant in the U.S. Army. Last year he received his MA from Columbia University. . . . RAYMOND E. HUDSON is with Dresser Industries, Salisbury, Md. . . . STUART A. HURD has become the first full-time zoning administrator in Bennington, Vt. He was hired by the planning commission to cope with the burgeoning growth of the town and he handles the issuance of permits, gives advice to developers, and rectifies zoning violations. He was chosen for the position out of a field of 78 applicants.

DAVID F. KENDRICK works as an associate forging engineer at Wyman-Gordon Co., North Grafton, Mass. . . . JAMES S. LOVENDALE is a programmer/analyst at the Fafnir Bearing Co., New Britain, Conn. . . . ROBERT P. MARKOT is a graduate fellow in mathematics at Ohio State University. . . . KENNETH H. MORGAN serves as a consulting engineer with Bay State Engineer Corp., Winchester, Mass. . . . WALTER S. NAGORSKI teaches at R. C. Lee High School, New Haven, Conn. . . . JOHN P. OBER is at the University of Chicago Business School. . . . GIRISH T. PATEL works as an estimator for Granger Contracting Co., Worcester. . . . ROBERT PETTIROSSI has been employed as a planning engineer at Western Electric Co., North Andover, Mass. . . . RANDOLPH J. SABLICH presently serves as a sales representative for Xerox, Boston. . . . JOHN C. SEXTON recently received his MA in mathematics from UCLA. . . . JAMES W. SMALL now works for Camp Dresser & McKee, Boston. . . . BARRY W. SODEN is assistant engineer at Northeast Utilities, Berlin, Conn. . . . ROBERT T. STULA is a project development engineer at Gulf General Atomic, Inc., San Diego, Calif. . . . STEVEN A. UDELL has become assistant department manager at C.I.T., White Plains, N.Y.

1971

Married: STEVEN P. DEXTER to Miss Janice L. Pepka on April 7, 1973 in South Grafton, Massachusetts. The groom's brother, LARRY P. DEXTER, '69, was best man. Mrs. Dexter is a teacher at Grafton Middle School. Her husband is a civil engineer for the Worcester County Engineering Department. . . . GEORGE HOMME and Miss Mary Jane Mulryan in West Boylston, Massachusetts on May 12, 1973. Mrs. Homme, a practical nurse, was employed in the medical intensive care unit at Worcester City Hospital. Her husband is New York regional representative for Instrumentation Laboratories, Inc., of Lexington, Mass. . . . NORMAN E. JOHNSON to Miss Cynthia Ann Sammons on May 12, 1973 in Pittsfield, Massachusetts. Both the bride and the groom are employed at GE Plastics. . . . VICTOR WALLOCK and Miss Iris F. Bronitsky in New London, Connecticut, on May 20, 1973. The bride attended the University of Connecticut. Her husband is process engineer at Crawford and Russell, Stamford.

GEORGE J. BAKEVICH completed his MS degree at the University of Utah last January and is now employed as a project engineer with the Schenectady Naval Reactors Office of the U.S. Atomic Energy Commisson in Schenectady, N.Y. . . . RAYMOND J. BISZKO is vice president at Guarantee Construction, Tiverton, R.I. . . . EDWARD F. CUNNINGHAM teaches at Sacred Heart High, Waterbury, Conn. . . . GREGORY S. DICKSON is a production development engineer at the Dow Chemical Company, Midland, Mich. . . . STEPHEN A. DIMING is a textile chemist at the United Elastic Co., Division of J. P. Stevens & Co., Inc., Woolwine, Va. . . . MATHEW A. GLUCKSON has joined Sunrise Knitwear Co., New York City. . . . DWIGHT P. EDDY works as a display and indicator design engineer at Norden Division, UAC, Norwalk, Conn. . . . WILLIAM B. ERICSON works for Data General Corp., Southboro, Mass.

RICHARD B. HOPEWELL is a process engineer for Badger Company, Cambridge, Mass. . . . ROSENDO D. JIMENEZ is a professor in the physics department at ITESM, Sucursal de Correos "J", Monterrey, N.L. Mexico. . . . 2/LT. JOHN C. JOHNSON, who received his MSEE from Kansas State University last spring, is with the U.S. Army at Brook Army Medical Center, Fort Sam Houston, San Antonio, Texas. . . . ERNEST R. JOYAL serves as an engineer-in-training at Naval Ship Systems Command, Crystal City, Va. . . . THOMAS J. KAMINSKI is now at the Goddard Space Center, University of Maryland, Greenbelt, Md. . . . GERALD J. KERSUS works as an electronics engineer at Booz, Allen Applied Research, New Shrewsbury, N.J. . . . MYLES KLEPER has completed his duties with the Peace Corps and is now located in Hamden, Conn. . . . DOUGLAS W. KULLMAN is currently assistant district traffic engineer with the Ohio Department of Transportation. . . . EMILE P. LEVASSEUR serves as a mechanical design engineer for General Electric's Aircraft Engine Group, Cincinnati, Ohio.

DOUGLAS H. MICHEL is with the nuclear plant operations at Knolls Atomic Power Laboratory, General Electric Co., Schenectady, N.Y. . . . CARL T. NELSON is a graduate

student at Kansas State University, Manhattan, Kansas. . . . JOHN A. NIESTEMSKI, JR. is studying at the University of Bridgeport (Conn.) . . . DONALD D. O'BRIEN substitute teaches in Boston, Mass. . . . RICHARD G. PACE is a sales engineer at Westinghouse Electric, Minneapolis, Minn. . . . ROBERT A. PAYNE has been employed by Essex Chemical Co., Clifton, N.J. . . . PAUL D. SANDBURG works for Deere & Company, John Deere Dubuque Tractor Works, Dubuque, Iowa. . . . EDWARD J. SHERMAN, JR. is a project engineer for Sessinghaus & Ostergaard, Inc., Erie, Pa. . . . ROBERT M. SINICROPE has been employed as a computer operator by the Massachusetts Eye and Ear Infirmary in Boston. . . . ALBERT W. STROMQUIST is studying at the University of Massachusetts. . . . DAVID L. TITTERINGTON, JR. is a graduate student at the University of Rhode Island in Kingston. . . . MICHAEL H. TUREK, who received his MBA from the University of Connecticut last year, now works for Monsanto Corp., Stonington, Conn.

1972

Married: ANDREW G. MAYSHAR and Cynthia J. Jacobson on April 14, 1973 in Webster, Massachusetts. Mrs. Mayshar is on the staff at Hahnemann Hospital, Worcester. Her husband is with the RCA Corporation in Burlington, Mass.

KENNETH C. ARIFIAN is a junior engineer with the Water Department in the Township of Livingston, N.J. . . . WILLIAM G. CATLOW serves as a development engineer for General Electric Co., Fitchburg, Mass. . . . CHARLES L. DESCHENES, development engineer, works for Fram Corp., East Providence, R.I. . . . STEPHEN E. DOMERATZKY is operation-production manager for WICN-Radio, Worcester. . . . DANIEL GACCETTA works as an assistant engineer for Factory Insurance Association. . . . WILLIAM D. GOODHUE, JR., who recently received his Master's Degree in mathematics from the University of Massachusetts, is now pursuing his doctorate there under a government fellowship. . . . CHARLES A. GREENE, JR., is working toward graduate degrees in geological oceanography under a research assistantship at Florida State University. . . . DR. ALLAN R. HAMBLEY is assistant professor at Michigan Technological University, Houghton, Mich.

JAMES A. HENDERSON has joined the General Electric Research and Development Center, Schenectady, N.Y., as a member of the new Industrial Research Graduate Study Program. The program is a joint effort between RPI and the GE Research and Development Center. While pursuing a course of study at RPI, the participant works half time during the academic year and full time during the summer. Henderson is a candidate for a Master's Degree at RPI. . . . THOMAS C. HUARD teaches at Woodstock Academy, Woodstock, Conn. . . . JOHN H. HUBBARD is with Torrington Company, Torrington, Conn. . . . PATRICK F. LAFAYETTE is studying for his MS at the University of Maine in Orono. . . . MICHAEL K. MALONE serves as a reliability engineer at GTE Sylvania, Needham, Mass.

HENRY C. MARGOLIS is a graduate student at the University of Vermont. . . . GREGORY C. MASSOUD has been employed by the Massachusetts Department of Public Works, Boston. . . . JAMES M. PERRY is a doctoral candidate at the University of Connecticut. . . . Navy Ensign DAVID G. RUSHTON recently received his commission as an ensign at the Aviation Officers Candidate School, Pensacola, Fla. He will proceed to the next phase of his aviation training leading to designation as a naval aviator or flight officer. . . . DINESH V. SHAH is a senior draftsman at Stone & Webster, Boston, Mass. . . . KI R. SOHN holds the post of superintendent of manufacturing at Sam Yang Grinding Wheel Co., in Korea. . . . Second Lieutenant BRUCE M. SZYPOT serves with the U.S. Army Signal Corp., Ballistic Labs., Aberdeen Proving Ground, Md. . . . LEON R. WECHSLER is director-information systems, for the Advanced Planning Research Group, Inc. . . . DR. CLIFTON E. WHEELER teaches chemistry and physics at Winchester (Mass.) High School. . . . JOHN O'DONNELL is an assistant civil engineer for the Town of Arlington, Mass. . . . BRENNAN McLAUGHLIN holds a teaching assistantship at WPI where he is a graduate student.

It's getting to be that time of year again

Homecoming is coming back

Friday and Saturday, October 19 & 20

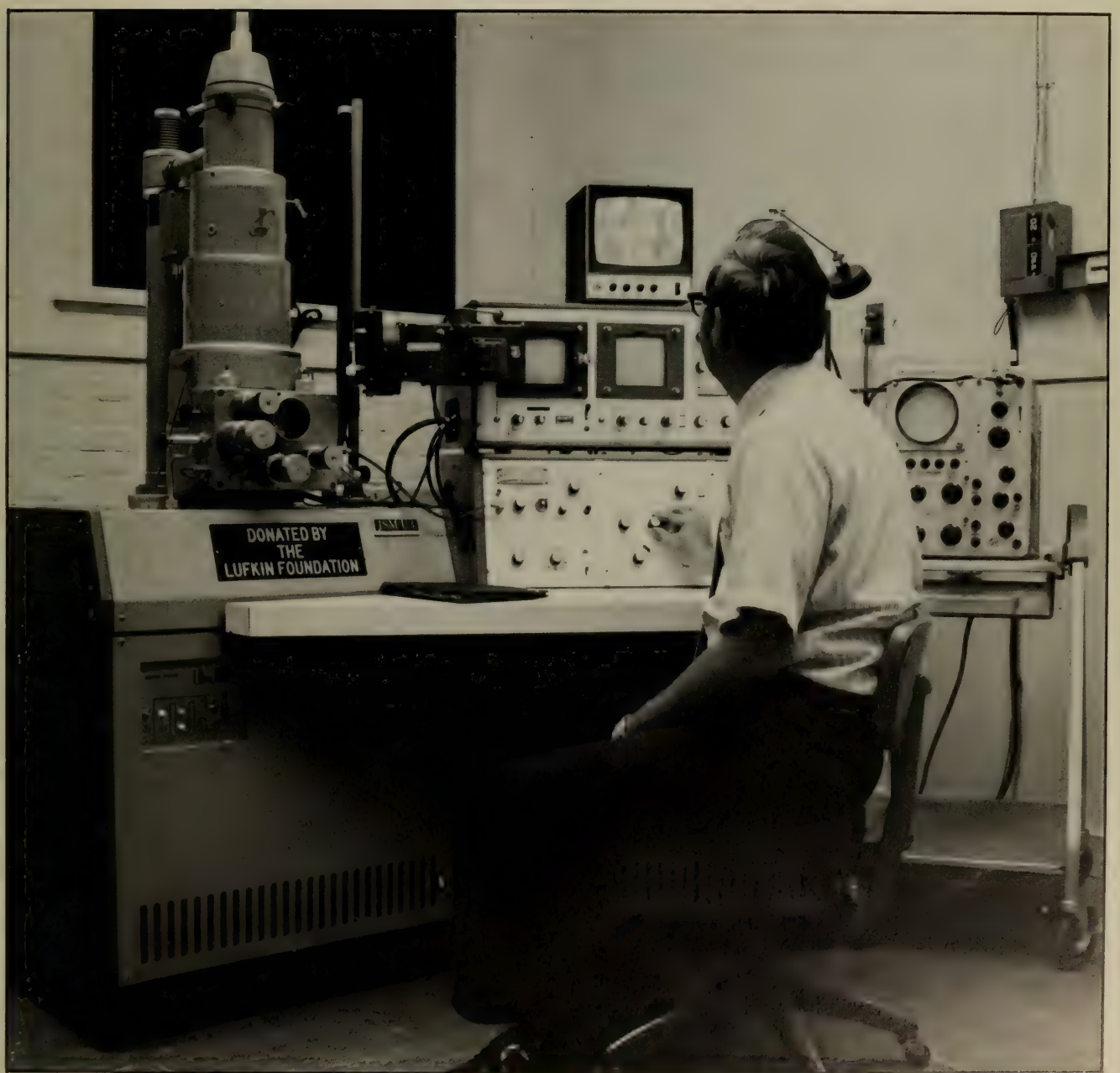
Concerts, Soccer, Football, Picnics,

the infamous Rope-Pull, and much more ! ! !

v. 77 no 2 (Sept 1985)
issued as WPI Undergraduate
Bulletin

October, 1973

JOURNAL



WPI's new scanning electron microscope

The Editor's Input

We are very happy to announce that the American Alumni Council and Time Inc. have awarded the *WPI Journal* a special citation "for significant improvement in alumni magazine publishing." The award, which takes into account both content and appearance, was given at the AAC annual meeting in Vancouver, B.C., last summer.

As you should know by now, at that meeting the Annual Alumni Fund was given a first-place award for improvement in the category of professional and specialized schools. That award from the AAC and the U. S. Steel Foundation carried a $1,000 cash award as well as a handsome moebius strip trophy.

And while we're on the subject of awards, the American College Public Relations Association has awarded special citations to two WPI publications: the invitation to membership in the President's Advisory Council, and "The WPI Plan for Personal Growth," a booklet designed for prospective students.

Because of the printing schedules for the *Journal,* I am writing this just a short while after the August issue went out in the mail, but already some 150+ questionnaires have been returned by readers. We hope that all of you will take the time to fill out the questionnaire. When we know what you want to read, we're in a better position to give it to you.

You may well have received extra copies of the August *Journal.* Our mailing house had some problems, it seems, and sent two *Journals* to nearly the entire list of WPI parents. The problems have been corrected, we believe, and this issue should reach you in the usual quantities. One side-effect of the extra mailing was that we have no extra copies of that issue on hand. We will have reprints of the main article, "The Theory of Alpha and Omega on Planet Earth," available for those who wish.

While we're talking about multiple copies, a number of people have inquired why they regularly receive two (or in a few cases three) copies. This happens chiefly when an alumnus is also a parent of a current WPI student. Our address lists come from two different sources (the Alumni Association and the Registrar's Office), and at present we have no reasonable way of finding names common to both lists. The cost of wiping out the address duplication would be far greater than is the expense of the extra copies. So please bear with the situation if you receive two copies—perhaps you could pass the extra along to a friend or to a high-school student who might be interested in WPI.

JOURNAL

ol. 77, No. 3 October, 1973

3 **A Letter** from new Association President Walter J. Bank.

4 **The Inward Eye**—a look at the surprising capabilities of WPI's new scanning electron microscope, an instrument adding a new dimension to student and faculty research.

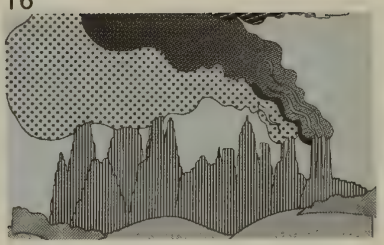
4 **Intersession** is coming back, and there's bound to be something in it for you.

6 **Technology Isn't the Villain—After All**—a measured response to the doomcriers who would have us turn our backs on the machine and go back to the Middle Ages . . . or at least to the 1950s.

1 **Miller Gets Teed Off**—If the Alumni Association held a golfing championship, Jim Miller would probably win it.

4

16



21

Departments

2 **Feedback**

3 **Completed Careers**

0 **Your Class and Others**

e Cover: On the front is shown WPI's new scanning electron croscope with ME Prof. Ronald Biederman adjusting focus. The ck cover shows one of the SEM's products—a view of the eye of ant at 926X magnification (enlarged from 300X).

---

itor: H. Russell Kay

umni Information Editor: Ruth A. Trask

blications Committee: Walter B. Dennen, , '51, Chairman; Donald F. Berth, '56; chard DeChard, '56; Robert C. Gosling, 3; Enfried T. Larson, '22; Roger N. Perry, , '45; Rev. Edward I. Swanson, '45

sign: H. Russell Kay

pography and printing: Davis Press, orcester, Massachusetts.

ldress all correspondence regarding itorial content or advertising to the itor, *WPI Journal*, Worcester Polytechnic stitute, Worcester, Massachusetts 01609 hone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1973 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. Postmaster: Please send form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

WPI Alumni Association

President: W. J. Bank, '46

Vice Presidents: L. Polizzotto, '70; F. S. Harvey, '37

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr., '44

Executive Committee Members-at-Large: C. W. Backstrom, '30; B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55

Fund Board: R. F. Burke, Jr., '38, Chairman; W. J. Charow, '49, Vice Chairman; L. H. White, '41; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

Alpha-Omega strikes responsive chord

The article, "The Theory of Alpha and Omega on Planet Earth," by Andreas and Annette de Rhoda, in the August 1973 *Journal*, is, in my belief, one of the greatest ever, anywhere.

Comparable to my feelings of enthusiasm for the subject and the way it has been handled by the authors, is my elation that WPI has had the fortune to bring this off. Hearty congratulations to everyone at WPI who had a part in this achievement.

Warren F. Burlingame, '17
Boston, Mass.

I read the "Alpha-Omega" article in the recent WPI alumni journal and I wanted to tell you how much I enjoyed it. The most interesting thing about the article is that it appears to be changing the whole character of the *Journal*. Does this mean that Tech is going to exercise some intellectual leadership in the engineering-technology world? It certainly looks that way and I think it is a very exciting prospect. A few more articles like that and the Journal will be on a par with the MIT publication, *Technology Review*.

Lawrence E. Fox
Executive Director,
Worcester Consortium for
Higher Education, Inc.

Ever since my son enrolled at WPI as a member of the class of '76, I have been receiving your publication. Because its aim is continuing education, and because it is basically technology oriented, I find myself reading the *WPI Journal* more thoroughly than my own *Brown Alumni Monthly*.

Your August issue just arrived (twice). Even though the topic is weighty, and I'll have to read it again to better understand it, I really don't need *two* copies. . . .

Ernest W. Tuckerman
East Providence, R.I.

Being compared with MIT and Brown is high praise indeed. At the same time the Journal *was awarded its citation for improvement, the* Brown Alumni Monthly *was given the Robert Sibley Award of the American Alumni Council as the best alumni magazine in North America last year. For more on the double copies problem, see the inside front cover.*

Not everyone liked it

My reaction to this article is so strong and so unfavorable that I am compelled to write you.

You state that "you have done things which were called controversial, things called absurd." Indeed you have. But this article goes beyond—far beyond—the controversial or the absurd. It is sheer tommyrot. Its inclusion in a publication BY the Worcester Polytechnic Institute FOR its Alumni Association is a sorry blot on the reputation of the Institute and is nothing short of an affront to the intelligence of its alumni.

You indicate that you may "continue the dialogue between author and reader in a future issue." Also, I note that one of the authors is scheduled to offer a course in the "Alpha-Omega Theory" during Intersession 1974. I strongly urge you to pass up both of these programs, as the repeated association of Worcester Tech's name with pseudo-scientific activities of this type (I have in mind also the *Journal* article by Ben Bova and the one about Genetic Engineering) will alienate a large body of the Alumni and do serious harm to the high standing of Tech as a solid school of Science and Engineering. I'm sure you don't want this to happen.

R. H. Dufault, '14
Spencer, Mass.

But the letters keep coming

My husband and I agree that the article "The Theory of Alpha and Omega" is fascinating and thought-provoking.

For myself, I admit with a feeling of relief and amazement that this article did clarify and express some of my own inner feelings and convictions. As a high school librarian I dip into many books, with the result that I know a little bit about a lot of things, but always wishing I could find some answers to some very big questions.

Being aware that change has accelerated beyond our usual expectations, it is stimulating to find authors who see a reason in this and a purpose. They also have been able to present their theory so laymen can understand it.

I hope there will be more of this in the *Journal*, and I look forward eagerly to the publication of the de Rhodas' book.

Jacqueline Armstrong
Littleton, N.H.

The Alumni Association

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS 01609

October 1973

Dear Fellow Alumnus,

I am honored to assume the leadership of your Alumni Association from Jim Donahue, who did such a marvelous job in guiding our organization through a difficult transition period. Our Executive Committee has already mapped out a plan of action to continue the fine work initiated during the past two years to improve the WPI Alumni Association.

WPI has progressed greatly in the last ten years, not only in physical plant, as those of you who have visited the campus recently can testify, but more importantly in its new approach to education at the undergraduate level. The WPI Plan has brought the college into the educational community limelight with its bold approach.

To complement the academic and administrative innovations adopted by WPI, the Executive Committee feels that a searching look should be taken at the WPI Alumni Association with the broad aim of improving its services to you, the alumnus, and to the college.

For that reason I have asked Bob Higgs to chair a Master Plan Committee to study our goals and objectives, communications, services, financial procedures and other activities. This committee will be expected to expand its thinking beyond our usually conservative New England approach to keep in step with the strides taken by the academic side of WPI.

Your thoughts and ideas will be welcomed by the Master Plan Committee at any time as they embark on this important new endeavor.

I look forward to your continued support in the coming year, both in WPI alumni activities and in the general promotion of our Alma Mater in your local community.

Sincerely yours,

Walter J. Bank

Walter J. Bank
President
WPI Alumni Association

The Inward Eye

Meet WPI's newest tool for scientific research and engineering advance: the scanning electron microscope

"That," said George Schmidt, flicking the room into darkness and moving to his chair before the console, his eyes fixed on the TV screen above, "that is the head of an ant."

The black-and-white screen filled up with a huge round object, with what looked like a massive antenna crossing the picture diagonally, and with an eye, a hemisphere apparently made up of a multitude of tiny, uniform segments.

"Magnification, George?"

"One hundred times."

He flicked a switch. "Three hundred times." This time the antenna covered one-quarter of the screen, the eye another quarter; its segments turned out to be subordinate eyes in their own right. In between them, miniscule hairs appeared vaguely.

Another flick; "one thousand." Nothing now but a large sector of the eye, the hairs now standing out clearly, each about as long as the diameter of one of those myriad sub-eyes. "The life science people tell me those hairs keep the eyes clean of dust and dirt," said Schmidt, the engineering assistant who operates the machine.

"Sort of like windshield wipers?"

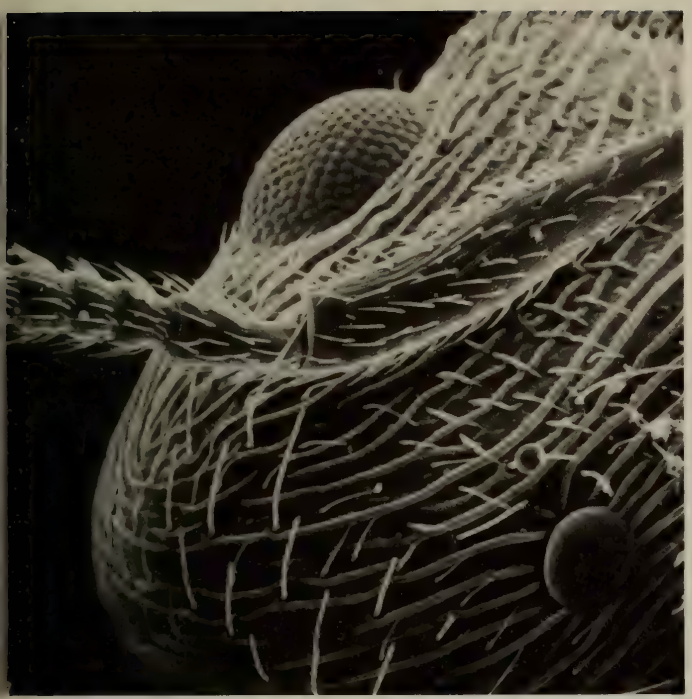
"Sort of, I guess."

The image grew again, to 10,000X. The screen was now filled with fragments of three sub-eyes. One windshield wiper stood among them like a giant single-limbed tree, rooted in a massive base that might well be a swivel device.

"Do you think these things move around 360 degrees and up and down to clean those eyes around them?"

"Who knows? It would make sense, wouldn't it?" He switched again, this time on another dial. "If you want to go still closer, you change from the TV to the cathode-ray viewing tube." This showed a scanning beam traveling from top to bottom, leaving behind a gradually fading fluorescence in which it was possible to study the image.

Another flick. "Thirty thousand times magnification." The tube was nearly filled with the lower part of one windshield wiper. "That's about as far as anyone would wish to go with a big specimen like this," said Schmidt. "Care to look at an aluminum fracture?"



This series of photographs shows the ability of the SEM to zero in on an object for study with increasing magnification. The subject is the head and eye of a common black ant. The photos were taken at magnifications of 100X, 300X, 1,000X, and 3,000X, and are enlarged 5 percent here.

This scene, which took place in mid-September, illustrates the remarkable ease of using WPI's newest significant piece of equipment, a JEOL JSM-U3 scanning electron microscope. The instrument was purchased with a grant from the Elizabeth A. Lufkin Trust, a Boston-based foundation whose generosity has been responsible for several important pieces of equipment at WPI over the years. Watched over by the materials engineering faculty, the scanning electron microscope is an interdisciplinary tool which is opening up a whole new world of perception, research, and learning for WPI faculty and students alike.

A short history of magnification; or, making small things big ain't easy

In the beginning there was the eye, naked and unaided; magnification 1X, resolution approximately 0.05 mm.*

Then came the magnifying glass; magnification typically 5X, resolution 0.01 mm.

Around 1590 a Dutch spectacle-maker named Zacharias Janssen invented the compound microscope. Eventually this instrument increased magnification to 2500X and resolution to 0.0002 mm, figures limited, ultimately, by the wavelength of visible light.

And that's all there was until about three decades ago, when our modern age spawned the transmission electron microscope. This gave a breathtaking leap to about 500,000X with resolution of 2 Angstrom units (one Angstrom = 0.0000001 mm), but a severe price had to be paid in convenience. Specimen preparation became a particularly troublesome proposition.

Metallurgical specimens had to be electrochemically reduced in thickness to about 2000 Angstrom units. Biological specimens had to be cut into very thin sections with an ultra-microtome, then fixed with high-density salts. And to examine the surface topology of any material, researchers had to make a very thin plastic replica of that surface, shadow it with a heavy metal, and then observe the surface indirectly. Even so, the results were plagued with imperfections which threw doubt on the accuracy of the observed image.

The scanning electron microscope (SEM) became commercially available about 1965; it was intended to be a bridge between the optical microscope and the transmission, or conventional, electron microscope (TEM). But in fact the SEM is a completely different instrument, and one cannot make a part-by-part comparison with the other two. The operating principle is so different that in order to make maximum use of the instrument a whole new way of thinking is required. And the SEM has its own special characteristics that make it much more exciting than the optical and transmission electron microscopes.

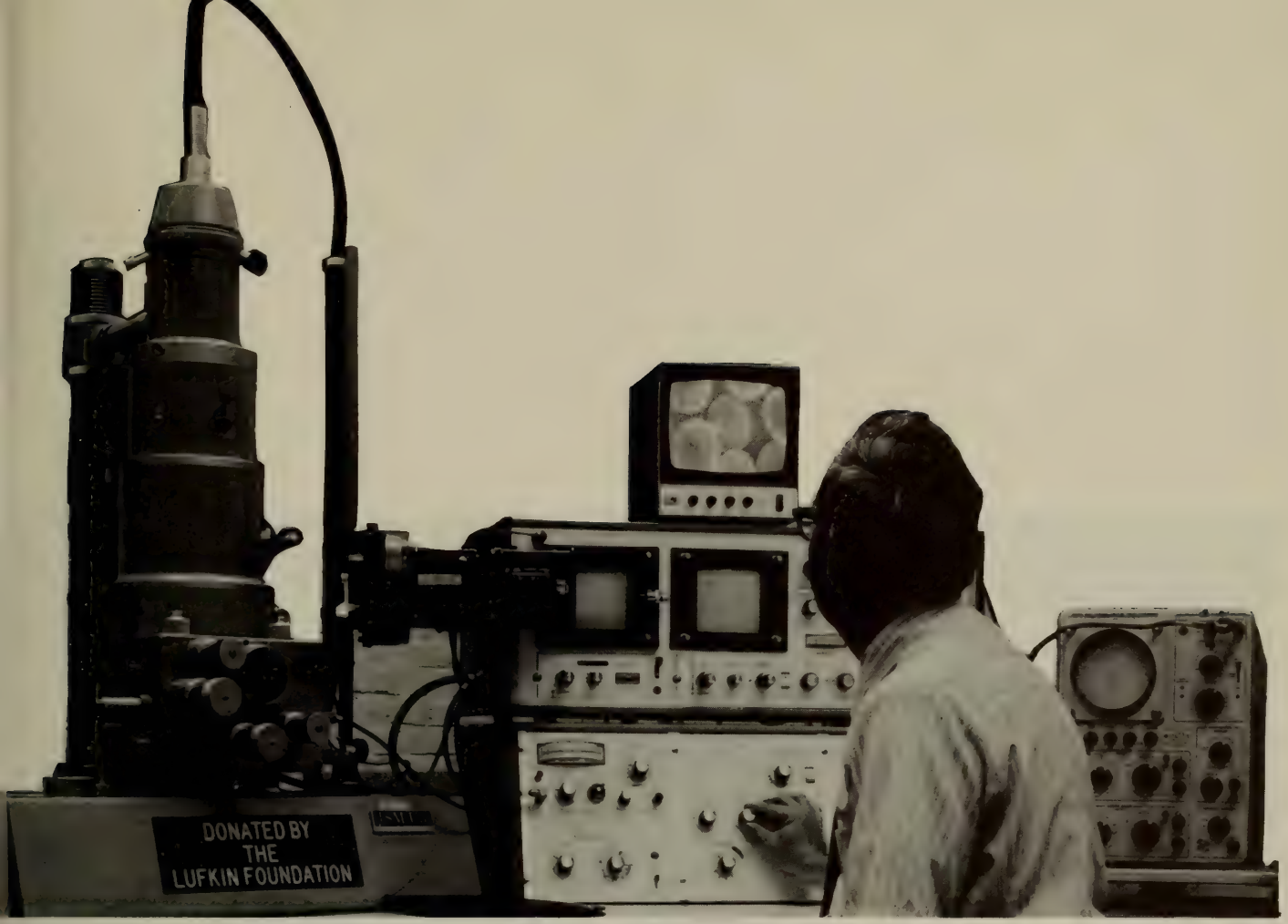
It can do much of what the optical instrument can do, but at higher magnifications (140,000X) and with greater depth of field. The SEM lacks the very high resolution of the TEM (resolving 100 Angstrom units at best), but specimen preparation is enormously simplified, and the instrument has such great depth of field that it lends a unique sense of three-dimensionality to the observed image.

Metallurgical specimens can be observed directly, with no preparation. Ceramic, plastic, and other non-metallic materials (including ants, as we have seen!) must simply be coated with a thin conductive layer (a gold-palladium alloy is used at WPI). The specimens don't have to be thinned, and no plastic models need be made. Quite massive specimens, approximately 1 inch square and ½ inch thick, are easily handled.

The optical microscope is limited by the long waves of visible light, roughly 3000 Angstrom units. The TEM is limited by the wavelength of electrons at a particular accelerating potential, perhaps less than one Angstrom. The SEM is not limited by wavelength, but rather by the narrowness of its electron beam, as little as 13 Angstrom units. It is the very narrowness of this scanning electron beam that creates the great depth of field and the apparent three-dimensional effect of the SEM image.

Looking at the third dimension of an object with the optical microscope, we can focus only on one plane at a time. We can see the peaks of the "hills" or the depths of the "valleys" one at a time. To a lesser extent this condition prevails with the TEM. But with the SEM both peaks and valleys come into sharp focus at the same time. It has to be seen to be believed. And when seen it *is* believed. It is completely credible.

**Magnification is linear magnification, that is, if an object 1 mm in length appears to be 10 mm long, we say that it is magnified 10X. Resolution refers to our ability to distinguish between two lines or two points a given distance apart.*



.et's stop a moment and compare these three close-ıp instruments:

Optical Microscope	**2,500X**	**.0002 mm (2000 Angstroms) resolution**
Transmission electron microscope	**500,000X**	**2 Angstroms resolution**
Scanning electron microscope	**140,000X**	**100 Angstroms resolution**

How the SEM works

The SEM starts with a thin hairpin tungsten filament in a column under high vacuum. When heated it emits electrons which are accelerated toward the anode cap and concentrated into a fine beam by the magnetic condenser lens. A set of deflection coils cause the beam to scan the specimen, back and forth in the manner of a television camera. Magnification is changed simply by changing the area of the scan: a large area for low magnification, a small area for high magnification. The beam strikes the specimen and causes it to emit "secondary" electrons, which are collected off to one side, converted to photons, and ultimately into an electrical signal feeding either the TV monitor or two parallel cathode-ray tubes. One of these has a long-persistence phosphor for viewing and focusing, the other a short-persistence phosphor for high-resolution photography.

If nothing else, the SEM is versatile. The electron beam striking the specimen produces secondary electrons; these produce the normal image. By tilting the stage upon which the specimen is mounted a few degrees between pictures, stereo pairs can be produced which give a truly three-dimensional view of the object under study. The electron beam also produces back-scattered electrons, which produce another sort of image. X-rays are produced, and the proper attachment to the SEM can produce chemical analyses from these X-rays. With suitable connections, semiconductor devices can be studied under transient conditions, while they are operating. For complicated subjects, the SEM can be used to produce non-pictorial images — sort of like contour maps.

1

2

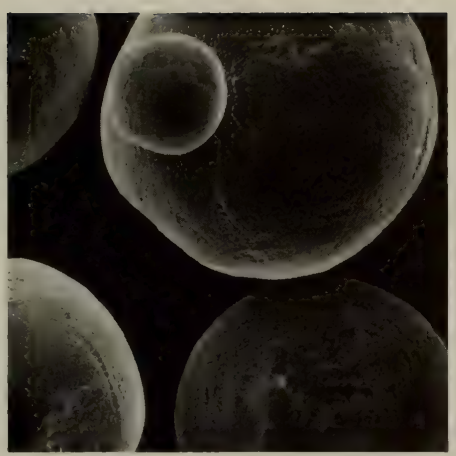
4

An interesting view of some everyday objects. ***1****: A pigeon feather at 142X.* ***2****: A worn diamond phono stylus at 355X.* ***3****: A stainless steel 200 mesh woven wire screen at 336X.* ***4****: The surface of the paper this* Journal *is printed on, magnified 323 times.*

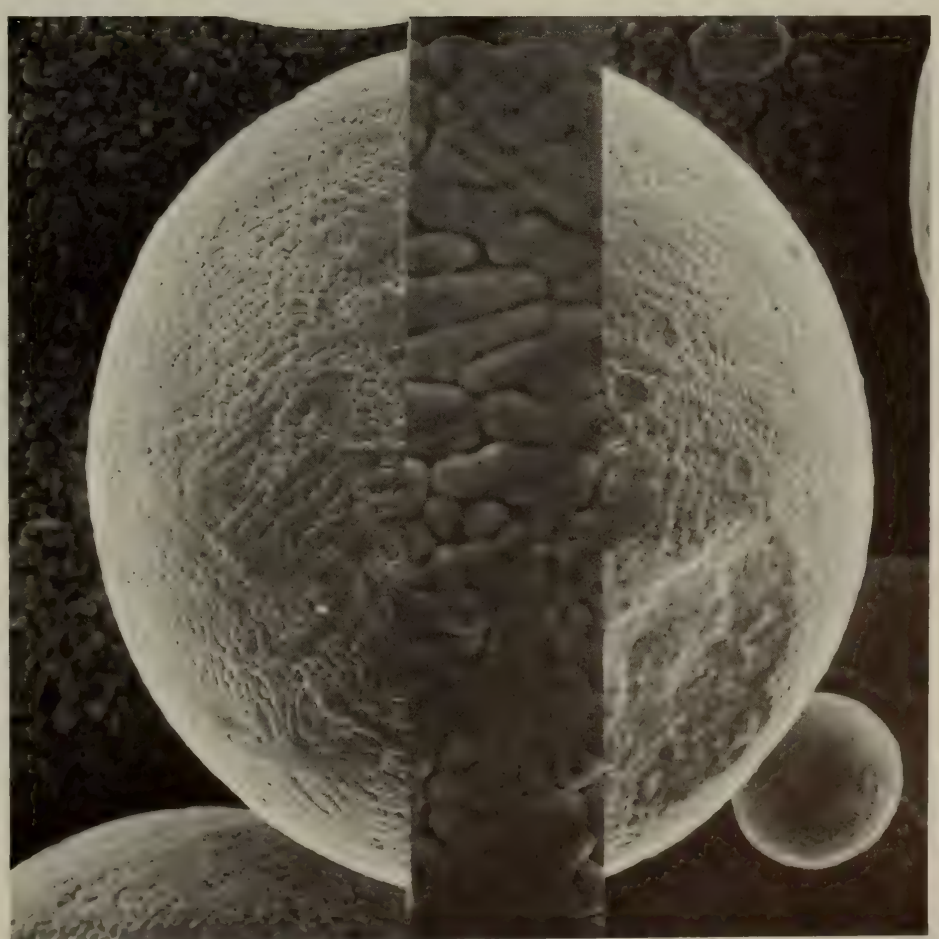
3

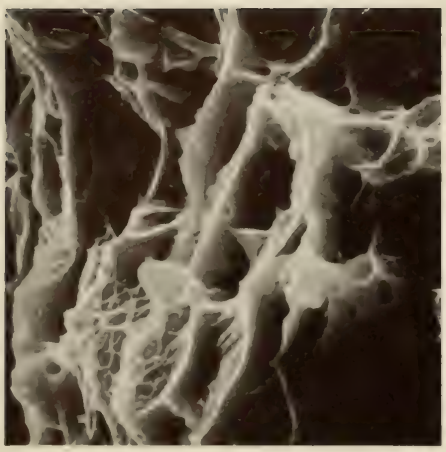
Mechanical Engineering and the Materials Group

The SEM is housed in the materials engineering section of Washburn under the direction of Prof. Ronald Biederman, in a room selected for its physical stability and freedom from stray electrical fields. (The survey which discovered this also uncovered the surprising fact that the room where WPI's TEM was housed — just down the hall — was one of the worst spots in the building from both standpoints!) The materials group, which specializes in the processing and fabrication of materials, is currently the primary user. According to Prof. Charles Reynolds, head of the group, they find the SEM extremely helpful in examining rough surface textures such as on electrical-discharge machined surfaces, plasma-sprayed coatings, powder metal parts, grinding wheels, shell molds, machined and ground surfaces (such as on bearings) and corroded and oxidized surfaces. Wear can be studied in detail. Fracture and failure analysis, the study of the mechanisms by which a material bends, cracks, or fractures, is immensely aided. New strengthening mechanisms can be examined on polished and etched samples. Phenomena such as chip formation and tool chatter on machined surfaces can be minutely studied.

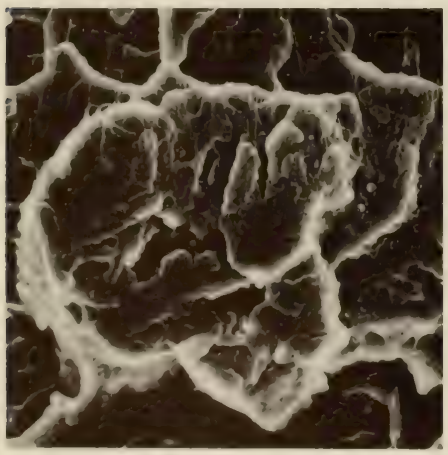


No, it's not a photograph of planets taken from a science-fiction movie. At left are spheres of an atomized nickel-base super-alloy powder shown at 198X. Below is the same powder at 570X, with the center panel shown at 1639 diameters magnification.

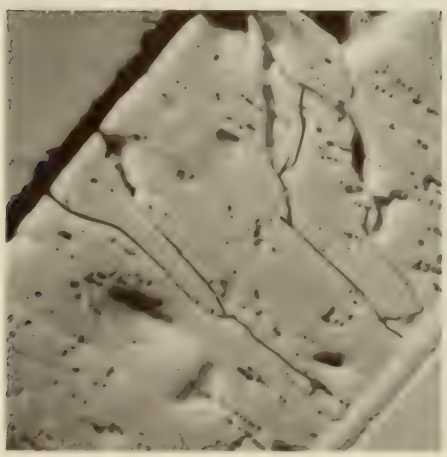




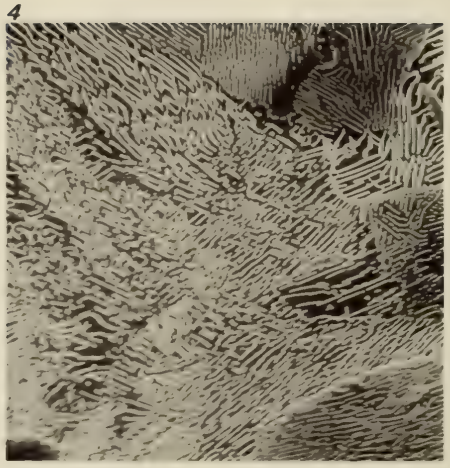
1



2



3



4

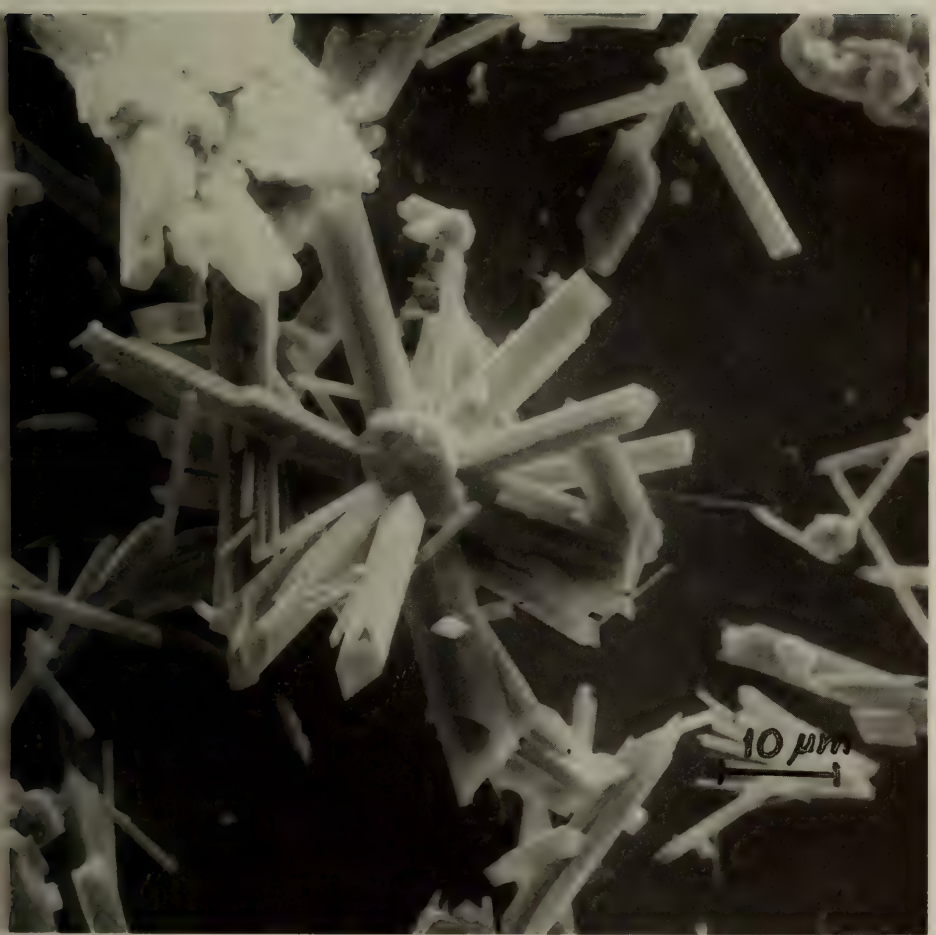
The SEM at work looking at materials. ***1:*** *A fracture surface in 2024 aluminum alloy, shown here at 3375X.* ***2:*** *Another fracture, this one in a less exotic material—a molded polystyrene spoon at 236X.* ***3:*** *The oxide layer on steel magnified 338 times. The outer layer, to the right, is Fe_2O_3 and cuboids of Fe_3O_4; the inner structure is FeO.* ***4:*** *Pearlitic microstructure in hot rolled 1045 steel, photographed at 2835 times.*

Chemical Engineering and the Zeolite Zealots

One of the major areas of interest in WPI's chemical engineering department is in the study of zeolites, a kind of crystal with very small, uniform pores. Zeolites distinguish themselves by their ability to adsorb substances such as ammonia, methane, and carbon dioxide. (Adsorb isn't a typographical error, by the way; it's a process by which one substance causes another to adhere to its surface. If it soaked it up, then the process would be *ab*sorption.) Because of this ability, zeolites are often referred to as molecular sieves. Zeolites can take nitrogen out of air, can squeeze out the last traces of water in the process of obtaining bone-dry nitrogen, argon, chlorine, and helium, for example. Zeolites also act as catalysts, altering the speed and end-products of chemical reactions. Oil companies have found, for instance, that zeolites can increase the yield of gasoline from petroleum by 20 percent by enabling more effective catalytic cracking.

These useful crystals can also help in the fight to clean up our air, by pulling sulphur dioxide and nitrogen oxides from the stack gases of power stations. They can help clean up NOx from auto exhausts, CO_2 from spacecraft cabins.

All this discussion of zeolites has a very real bearing on the new SEM. It appears that many zeolites' properties are related to their physical or crystalline structure. For the first time, the minute crystals can be readily seen and studied through SEM images. The pictures, such as on this page, show the extraordinary beauty and symmetries of the molecular sieve zeolites. Who says that science can't deal with aesthetics too?



The strange beauty of zeolite crystals. Both pictures show synthetic sodium-mordenite and analcime, above at 1462X and at right at 3253 times.

Life Sciences: You can freeze-dry my specimens but I'll have my coffee fresh-perked, thank you

From a layman's point of view, perhaps the most exciting new window of perception via the SEM is opened up to the life sciences department. The ant pictures give a hint of the amazing clarity with which biological specimens can be explored. The SEM will be a key learning tool in a unique new course (LS 3550, Microanatomy), which combines microanatomy with histology (study of fibers), cytology (study of cells), and molecular biology.

Another area of interest in this fastest-growing of WPI's departments is the study and comparison of cells undergoing natural development (such as division and differentiation) and abnormal development (such as in cancer). Here too the SEM unlocks many otherwise-hidden observations.

The types of specimens that life sciences people deal with, however, present a special problem for the SEM. Since the scanning beam operates in a high vacuum, any moisture in the specimen will boil off and contaminate the chamber. Therefore the specimens must be dried. The present process is chemical in nature, and is rather time-consuming. The efficient method is freeze-drying, wherein the specimen is frozen

and then placed in a vacuum so that the ice will sublimate, or pass directly to a gaseous state, leaving the specimen perfectly dry and otherwise undamaged. Unfortunately, there is no freeze-drying equipment at WPI, and to obtain freeze-dried specimens, the life science people will, for the time being, have to rely on coffee and those foods carried by the backpacking outfitters and mountain shops.

This is the end-product of one of the SEM's non-pictorial modes, a Y-modulation representation of a photo-etched copper grid at 494 diameters magnification.

Electrical Engineering: How do your crystals grow?

The integrated circuit is a microminiaturized wonder that may contain up to several hundred separate electronic components grown on the surface of a crystal of semiconductor material. Typically, one of these crystals is only 0.01 mm square by 0.002 mm thick. The space between individual parts of the circuit is less than the thickness of a human hair. More reliable than discrete components, as well as smaller, they have revolutionized the electronics industry. They are widely used in radar systems, the space program, color TVs, computers, auto safety systems, and all forms of scientific instrumentation.

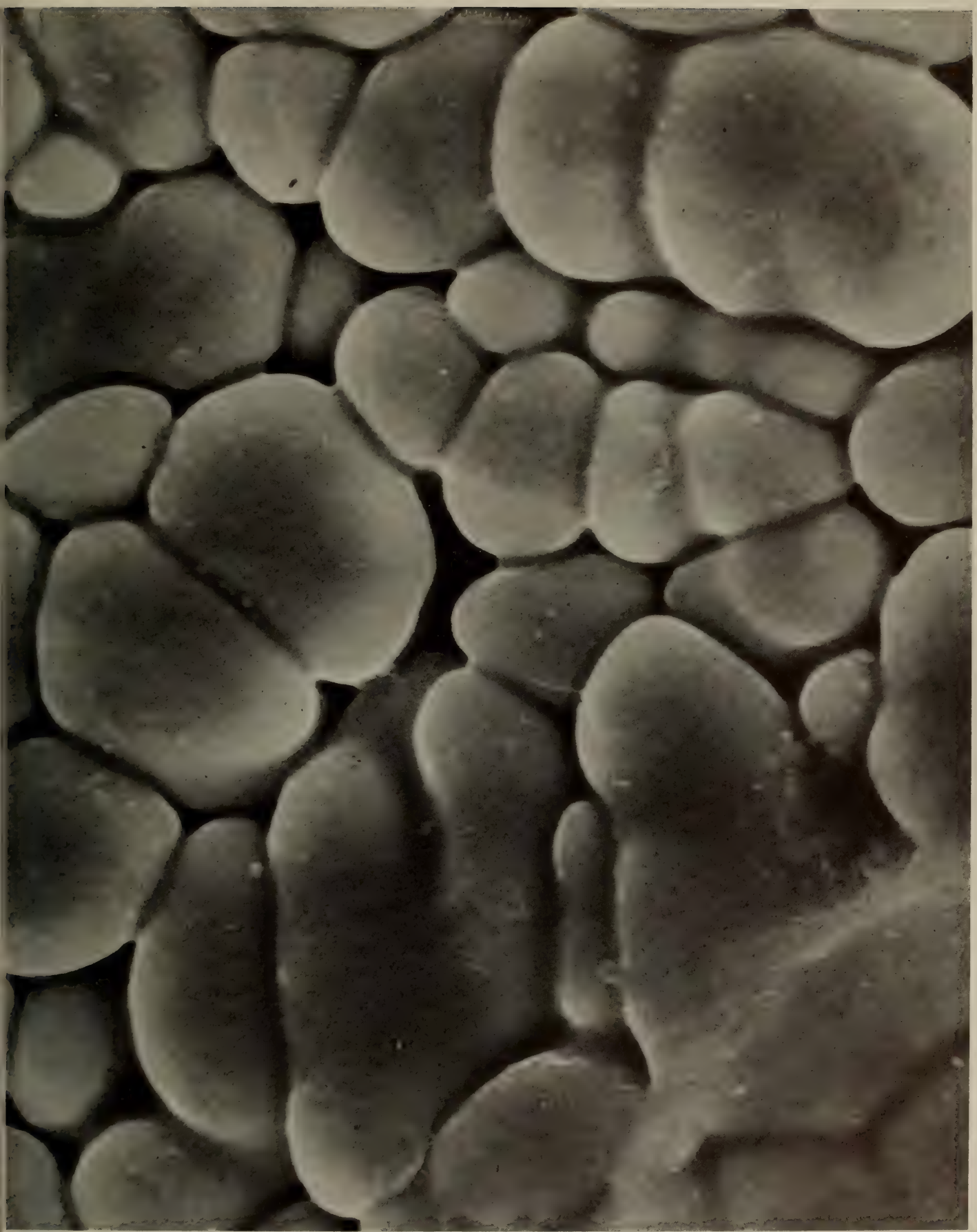
The SEM is one of the few tools delicate enough to check which of the hundreds of components in an IC may not be functioning properly. ICs can be inspected while the circuits are operating. In association with a computer, the SEM enables the design of circuits which will use only those components of an IC which are working properly, avoiding those which are faulty. Thus the entire circuit doesn't have to be thrown out for the lack of a few elements, perhaps because of unavoidable flaws in the crystal on which the components were grown. This is a design avenue which is being actively investigated by the major electronics companies as a way of increasing still further the complexity and size of circuits which can be grown on a single crystal.

The SEM as a learning tool

The SEM is a fascinating technical instrument, but lots of other colleges have one. What they don't have, though, is the WPI Plan and WPI's commitment to meaningful undergraduate education. As with other advanced facilities (such as the computer center, the nuclear reactor, and Alden Research Laboratories), the SEM is available to undergraduate students on a hands-on basis; it does not remain a "toy" for faculty and graduate students alone. It affords students a unique and invaluable resource for their projects, and it will enable them to do work of a higher and more professional caliber than they might otherwise be able to achieve.

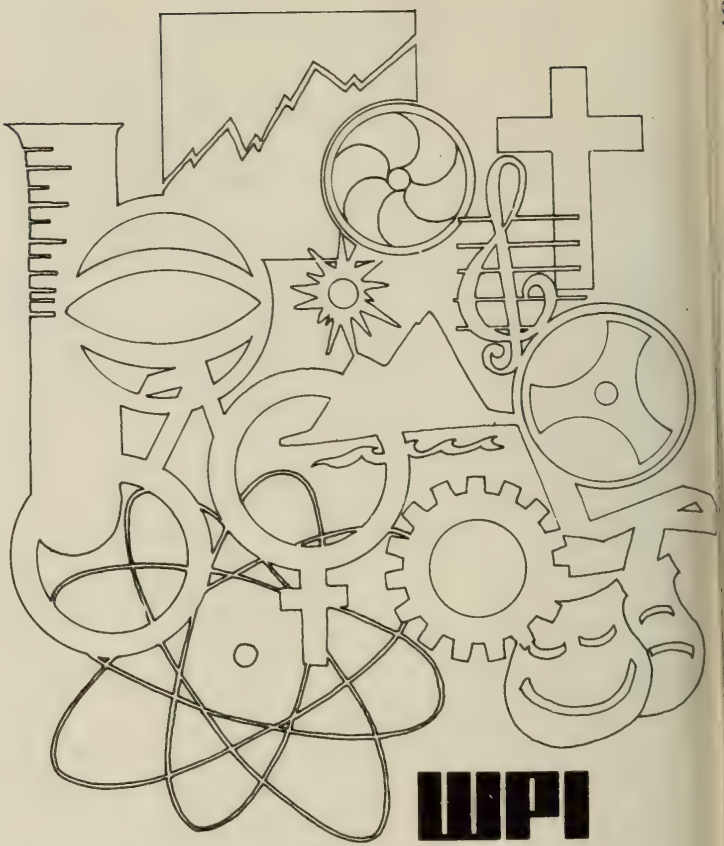
Prof. Donald Zwiep, head of the mechanical engineering department, summarized the value of the instrument in this fashion: "Students and faculty, working as an academic team, will indeed be partners in probing the frontiers of the structure and properties of materials of all kinds. The scanning electron microscope provides a natural technological bridge as the student moves from education to industry."

Another professor said it a little differently: "What is needed more in education than the excitement of individual discovery? That, to me, is what the SEM is all about." □



The surface of the atomized super-alloy powder shown earlier on page 9, here reproduced at 20,000X (enlarged from 10,000X).

Back by Popular Demand!



WPI's

Intersession,

in the new, improved 1974 edition

☞ *January 7-18*

- ***More courses!***
- ***Cheaper prices!***
- ***More sessions!***

Intersession 1974 will take place January 7-18, with a total of four individual sessions to be scheduled during that two-week period. Once again WPI offers to students and the community at large a wide variety of courses to provide intellectual enrichment, advance avocational interests, or further professional competence. Although the program is offered primarily for WPI students, certain technical topics have a strong attraction for recent graduates while earlier graduates will also find the business and management courses of interest.

The list which follows is selected from the total offering for Intersession, and represents approximately 1/3 the total number of courses to be given this year. Once again, alumni are offered a reduced rate for full tuition courses while courses of a general interest nature are being offered at the special low rate of $30. For more information, write: Director of Continuing Education, Room 310 Boynton Hall, WPI, Worcester 01609.

The schedule for Intersession 1974 is as follows:

Session A	January 7- 9	(M,Tu,W)
Session B	January 10-11	(Th,F)
Session C	January 14-15	(M,Tu)
Session D	January 16-18	(W,Th,F)

The letter(s) of a course number indicate during which session it is being given. Thus, course A400 will be held during Session A. ABCD400 indicates one course extending over all four sessions.

REGISTRATION

You may apply for Intersession courses starting November 5 through the Office of Continuing Education (Boynton Hall 310), in person or by mail. If registering by mail, please phone or write to request a registration form and determine if space is available in the desired course. Tuition rates, including lunch on each day the topic is presented, are as follows:

$115—Regular
- 95—Regular early registrant (on or before December 20)
- 90—WPI evening students
- 80—ALUMNI AND PARENTS OF WPI STUDENTS
- 60—The course CD421—Electronic Information Processing
- 30—Courses which are italicized

$450—Group rate for 6 people (if registered on or before December 20)

NOTE: All participants registering after December 20 must pay the regular rate ($115) for all courses. Tuition rates do not include any extra fees which may be associated with individual courses.

In all cases, the lowest tuition rate applies. Rates are per topic, independent of course duration.

Send to:

Director of Continuing Education
WPI, Worcester, Mass. 01609

I would like more information about Intersession. Please send me a copy of the 1974 Intersession catalog.

Name _____ Year _____

Address _____

city _____ state _____ zip code _____

ABCD405*	Practical Optical Microscopy
ABCD406	"Guten Tag": Introductory Conversational German
CD417*	Biology, Physics and Chemistry of Life
CD421	Electronic Information Processing: Physical Principles and Materials Technology
A419	Astrology
A434*	ICES (Integrated Civil Engineering Systems)
A435	Maxicomputers
A437*	Engineering Economy
A443*	*Our Engineering Heritage*
A447*	Survey of Control Engineering
A449*	*Modern Russian Literature: Dostoevsky to Solzhenitsyn*
A450*	*Poetry for Delight and Wisdom*
A454	*Guide to High Fidelity Equipment*
A455	*Biblical Literature: Introduction to Old Testament*
A456*	*Christian Ethics and Social Responsibility*
A457*	*Christianity and the Occult*
A458*	Elementary Particles
A460*	Topics in Physics of Transistors, Fets and Microwave Oscillators
A463	*Technology and Man's Future*
A467*	Astronomy
B433	*You and Your Money*
B436	*Introduction to Organic Gardening*
B438*	*The American Indian in Literature*
B440	Processing of Non-metallic Materials
B443	Who is John Galt?
B444	*Handwriting Analysis: A Primer*
B449*	Technology of Human Behavior
C422	*Biblical Literature: Jewish Approach to the Old Testament*
C429	Unit Operations for Environmental Problems
C431	Introduction to Product Safety and Liability
C434*	Scanning Electron Microscopy
C435	Survey of Biomedical Engineering
C437	*Parody: Sense and Nonsense*
C438*	*H. G. Wells and the Science Fiction Novel*
C439*	*Wilderness and the American Mind: An Ecological View of Modern American Literature*
C447	*A Rhetorical Happening*
D422*	*Vitamins and Nutrition*
D430*	Practical Chemical Manufacture
D431	Glassblowing
D433	Computer Operations
D434	Programming the Programmable Calculator
D436*	*The Trolley Car: Triumph of Transport*
D437*	Money and Banking: Master or Servant?
D439	High Speed Static Relays
D442	*Israel: A Modern Perspective*
D447*	Neutron Activation as Nondestructive Chemical Analysis
D448*	Strain Gages
D450*	*Sartre and Camus: Existentialism as Literature and History*
D451	A Fun and Games Approach to Combinatorial Topology
D456	*Biblical Prophecy and its Interpretation*
D463*	World Dynamics and the Limits to Growth
D469*	How to Finance and Manage a Small Business

*Available for credit. Tuition for italicized courses is $30.

Technology isn't the villain—after all

Reprinted from the February 3, 1973 issue of *Business Week* by special permission.
© 1973 by McGraw-Hill, Inc.

Like the "dark Satanic mills" of an earlier day, technology has been soundly drubbed by environmentalists these last few years. Barry Commoner, casting technology as villain in his book, *The Closing Circle,* censured aluminum, chemicals, and other high-polluting, energy-intensive industries. Innumerable others have flayed the internal combustion engine, turning it into the most villified machine since the Luddites smashed their knitting frames. And the SST is still seen by many as a symbol of runaway technology.

Lately, though, a remarkable resurgence of faith in technology seems to be occurring among some environmentalists. Is there an energy crisis? Well, bring on geothermal power, solar power, nuclear fusion, and even tidal power. Want to curb auto pollution? Build Stirling-cycle engines or develop lithium batteries. Even the 1972 Water Pollution Control Act genuflects to the technological gods: It calls for the total elimination of effluents by mandating the "best-available technology." Suddenly, technology has gone from villain to savior.

Why the changed mood? How valid is it? Were the original criticisms misguided?

As understanding of environmental problems grows, the public is realizing that while technology may have been the cause, it is also the only answer.

Unused technologies. At the first Earth Day nearly three years ago, much of the anti-technology talk was simply "back-to-nature" longing, human frustrations vented at a mechanized world. Later, more thoughtful critics posed two arguments. One, exemplified in the SST debate, was that technology has become a juggernaut. The Sierra Club, Environmental Action, and other groups charged that a "technological determinism" had taken hold: If we were capable of doing something, we did it, without due regard to the social consequences. Like Mt. Everest, the technological heights were scaled just because they were there.

The second argument, advanced by Commoner, held that industry, in pursuit of higher profits and productivity, had displaced older technologies with more environmentally damaging products and processes (*Business Week,* Oct. 23, 1971). Thus, phosphate detergents displaced soap, one-

way bottles and cans outsold returnables, gasoline-gulping cars muscled out economy vehicles, non-degradable plastics replaced paper packaging, synthetic fibers won markets from cotton and wool, and energy-intensive aluminum production took over from steel and lumber. These technological shifts, Commoner said, were more important than either population or economic growth in bringing on the environmental crisis.

Though Commoner's analysis was at least partly true, he failed to see that the crisis was also due to our failure to use the technology we already had. To this day, one-third of all Americans (including the residents of Manhattan) have no primary sewage treatment — even though the technology has been available for decades. Similarly, some utilities have not installed stack controls — even though precipitators were invented nearly 50 years ago. Furthermore, though some control technology is presently unavailable, Commoner did not recognize that effective regulation could spur its development.

This is now happening at a rapid rate, which may explain the new faith. Some of the advances are complex Band Aids, such as equipment to scrub stack gases or catalytic devices to purge auto emissions.

But increasingly, engineers are going much further, designing totally new processes. Inland Steel Co., for instance, is using a process developed by Coaltek Associates that sharply cuts pollution from coke ovens. TRW, Inc., under a grant from the Environmental Protection Agency, has found a way to remove sulfur from coal before burning — a process the EPA estimates will enable 40% of high-sulfur Eastern coal to be burned without violating 1975 air quality standards. Last month alone, two advances were announced that merit the term breakthrough. Alcoa developed a new aluminum smelting process that uses 30% less energy and eliminates fluoride emissions. And Anaconda unveiled a chemical process for leaching copper from ore without creating any sulfur oxides — the bane of traditional copper smelting.

As these examples show, environmental imperatives are forcing industry to look at their processes from a radically different perspective. Environmental impact is now a critical design factor along with economic feasibility — and both serve as checks on "technological determinism." Moreover, production approaches once deemed too costly may now be attractive, compared with the alternative of expensive treatment facilities. "The incentive exists for a complete rethinking in many industries," says EPA's Robert Sansom.

Unreasonable faith. As welcome as all these changes are, the new technological optimism has its dangers. For one, new developments have a nasty habit of creating unforeseen side effects. And as EPA Administrator William D. Ruckelshaus points out, unreasonable faith can lull people into thinking there is a "technological fix" for every problem.

Unfortunately, there isn't. Even a pollution-free car will not eliminate the environmental damage cars do to cities. No technology is likely to keep up with energy demands that double every decade. Nor can technology fully succeed in recycling solid waste so long as tax laws, freight rates, and consumer habits continue to discourage conservation. In short, new attitudes toward consumption, economic growth, and life style may eventually prove as important as new technology.

Perhaps the lesson in all this is that technology, though no panacea, can respond to some environmental demands. Properly directed by business and government, it can undo much of the environmental damage it once wrought. Neither villain nor savior, technology is one practical means to an enlightened end. □

Completed Careers

LANCE W. STAUGHTON, '06

Lance W. Staughton, a retired chief engineer for Rockwood Sprinkler Systems in New York and Worcester, died in Shrewsbury, Massachusetts on July 15, 1973. He was 89 years old.

He was born in Melbourne, Australia. Later he studied at WPI. After 45 years of service, he retired from Rockwood in 1954. He had been head of the cost analysis department since 1939.

Mr. Staughton was a member of Sigma Alpha Epsilon Fraternity.

CLINTON D. SMITH, '12

Clinton D. Smith, the former vice president of Schuylkill Valley Lines, Inc., Norristown, Pa., passed away in East Stroudsburg, Pennsylvania on May 28, 1973.

After graduating from WPI as an electrical engineer, he became associated with Public Service Co. of New Jersey; Pennsylvania-Ohio Power & Light Co., Youngstown, Ohio; Beaver Valley Traction Co., New Brighton, Pa.; Cleveland Railway Co.; and Western Railway Co. Following his retirement from Schuylkill, he was a self-employed transportation and research consultant.

Mr. Smith belonged to Sigma Xi and Tau Beta Pi. He was past president of the Norristown Chamber of Commerce, the Operating Division American Transit Association, and the Pennsylvania Bus Association. He also had served as president of the Philadelphia Chapter of the Alumni Association.

ARTHUR B. SCHOFIELD, '13

Arthur B. Schofield, 81, died July 2, 1973 at Miami Beach, Florida.

He was born in Worcester on May 30, 1892. In 1913 he graduated from WPI as a civil engineer. He served for over two years as a lieutenant in the Corps of Engineers in the French Theatre in World War I.

From 1922 until 1937 he was a partner and treasurer in the E. H. Clement Construction Co. in Charlotte, N.C. He then retired to Miami Beach where he lived until his death.

Mr. Schofield, a loyal supporter of WPI, was the cousin of MALCOLM B. ARTHUR, '20.

FREDERIC L. HOLBROOK, '17

Frederic L. Holbrook died May 14, 1973 in Connecticut.

A Boston native, he later studied chemistry at WPI. After graduation he worked a short time as a chemist for Goodyear Tire & Rubber Co. He then was with the chemical warfare department of the U.S. Army. From 1919 until 1960 he served as a chemist, rubber technologist, and manager of rubber chemicals sales service for U.S. Rubber Co. (now Uniroyal).

He was a member of the American Chemical Society, Tau Beta Pi, and Sigma Xi. He was the cousin of HARRISON E. HOLBROOK, '44.

ERNEST C. BARKER, '24

Ernest C. Barker passed away on May 19, 1973 in Escondido, California.

He was born on Dec. 4, 1901 in Worcester. After graduating from WPI as a mechanical engineer, he worked for General Electric Co. Later he was associated with the Association of American Railroads; Gerrard Steel Strapping, Division of U.S. Steel Corporation, Chicago, where he was chief engineer; and U.S. Steel Supply, Chicago, where he was a research and development engineer.

Mr. Barker was a member of ASME, Tau Beta Pi and Sigma Xi.

CARROLL C. TUCKER, '24

Carroll C. Tucker, retired chief engineer for Reed & Prince Manufacturing Co., died June 11, 1973 in Worcester.

He was born on April 30, 1902 in Brookfield, Vt. After studying at WPI he took courses at MIT, Boston University, and Northeastern University.

Mr. Tucker was associated with the Reed & Prince engineering department for 10 years before being named chief engineer in 1965. He retired from the Worcester firm in 1972. Previously he was with Matthews Manufacturing Co., Raytheon Co., and Pratt & Whitney Aircraft Division.

A registered professional engineer, Mr. Tucker was past president of the Worcester Engineering Society. He belonged to the American Society of Metals, Worcester County Mechanics Association, American Standard Association, and the Tech Old Timers' Club.

MAURICE E. GODDARD, '25

Maurice E. Goddard died on January 18, 973 in Evergreen Park, Illinois.

Born in Winchendon, Mass., on October 7, 1902, he later graduated as a civil engineer from WPI. He was employed by the National Board of Fire Underwriters; the Chicago Board of Underwriters; and from 929 until 1968 by the Factory Insurance Association, Chicago, where he was superintendent of the Inspection Department.

Mr. Goddard belonged to Phi Sigma Kappa Fraternity. He was a former secretary-treasurer of the Detroit Chapter of the Alumni Association.

WILLIAM R. HUTTON, '29

William R. Hutton passed away last winter n New York.

He was born in Manchester, Conn. After raduating from WPI as a mechanical engineer, he joined The Buffalo Forge Co., Buffalo, N.Y. From 1933 until his retirement everal years ago he was with The Coon-eVisser Co., Detroit, where he served as resident and treasurer. At the time of his eath he was living at The Farm Bell, his ome in Dewittville, N.Y.

Mr. Hutton was a member of Alpha Tau mega. He was a past president of the etroit chapter of the Alumni Association.

HARRY A. SMITH, JR., '34

Harry A. Smith, Jr., 62, died June 8, 1973, in Pittsfield, Massachusetts.

A lifelong resident of Pittsfield, he attended WPI, and was later employed by the General Electric Co. for 38 years. At the time of his death he was a production supervisor for the power transformer department.

He was a member of the G. E. Quarter Century Club, GEAA, and Phi Kappa Theta Fraternity. In World War II he served with the 104th Infantry Division.

STANLEY M. TERRY, '40

Stanley M. Terry, 55, former manager of engineering at American Bosch Division of AMBAC, Springfield, Mass., died in July at his home in Dayton, Maine.

He owned several patents, including one on a heavy alternator which is being marketed by Maremont Corp. in Saco, Me.

He joined American Bosch in 1950 and became manager of engineering in 1957. In 1959 he resigned to join R. E. Phelon Co., East Longmeadow, Mass. He rejoined American Bosch in 1961 as manager of electrical engineering. Two years ago he became associated with Maremont Corp., Saco, as manager of special products and director of electrical products, research and development.

Mr. Terry was born in Sturbridge, Mass., on January 21, 1918. He received his BS in electrical engineering from WPI. He was a member of AIEE, the Society of Automotive Engineers, American Institute of Aeronautics and Astronautics and Lambda Chi Alpha Fraternity.

GEORGE C. LOWE, '46

George C. Lowe, 49, chief industrial engineer for the Thom McAn Division of Melville Shoe Corp., Worcester, passed away in Worcester on June 8, 1973.

The Worcester native received a degree in chemical engineering from WPI in 1946. He was employed by William Allen Son's Co., Worcester, where he designed a new type of dyer which reduced by 25 per cent the time needed to color woolen fibers for clothing. Later he was plant engineer at Bell Co. and superintendent for the Papercraft Greeting Card Co.

Mr. Lowe belonged to the American Chemical Society and the National Rifle Association. He was a World War II Navy veteran.

JOHN K. LELAND, '55

John K. Leland, 46, died in June while visiting in Tampa, Florida.

He was born in Worcester, earned a degree in chemical engineering from WPI, and most recently was with Collagen, Inc., in Boston. Earlier he had worked at Bethlehem Steel Co.; the U.S. Navy Propellant Plant, Indian Head, Md.; and Atlantic Research Corp.

Mr. Leland was a veteran of World War II and the Korean War. He had served as president of the Washington (D.C.) Chapter of the Alumni Association.

Your Class and Others

1912

J. FRANCIS GRANGER was recently honored at the 13th annual (Mass.) Highway Officials Workshop Conference where his successful planning of the conference was cited before the group. Although Mr. Granger retired as superintendent of streets and city engineer in Marlboro (Mass.) in 1960, he has continued to be active professionally in the important role of secretary of the Massachusetts Highway Association.

1920

BURTON W. MARSH is on the executive committee of the National Committee on Uniform Traffic Laws and Ordinances. Formerly he was chairman of the committee. . . . Mr. and Mrs. ALBERT L. WOODWARD celebrated their 50th wedding anniversary June 30 at an informal tea in Cranston, R.I.

1929

DR. ARTHUR H. BURR has been named Hiram Sibley professor of mechanical engineering, emeritus, at Cornell University's College of Engineering. A veteran of almost 35 years of teaching, he has held engineering positions in universities across the United States and in Latin America. He also served as chairman of the department of machine design from 1947 to 1968 at Cornell and has written a textbook, *Advanced Mechanical Analysis.* This fall he will join the staff of the University of the Americas in Puebla, Mexico.

1930

DR. PHILIP M. SEAL has retired as a professor of electrical engineering at Norwich University, Northfield, Vt. He joined the faculty in 1956. Earlier he had taught at the University of Maine and Purdue. He also had professional experience with several electrical manufacturing companies. . . . THEODORE J. MESH, who was formerly with Gilbarco, Inc., Greensboro, N.C., has retired.

1933

LINVAL D. HARVEY, senior vice president-administration for Allendale Insurance Company (the world's largest mutual insurer of industrial properties) saw his years of planning as a project administrator come to a happy conclusion the first week in June. That week marked the opening and dedication of his company's new corporate headquarters at Allendale Park, Johnston, R.I. Mr. Harvey, who had supervised the development of the project since 1969, has been listed in both *Who's Who in the East* and *Who's Who in Finance and Industry.*

1934

C. EUGENE PARTA retired last year as both a civilian and a Commander in the U.S. Naval Reserve. Currently he resides in Manassas, Va. . . . LOUIS PRESS has retired from the Connecticut State Department of Health and is now employed with the Hartford Insurance Group as laboratory supervisor in the recently opened Industrial Hygiene Chemistry Laboratory.

1935

THEODORE R. LATOUR retired in May from the DuPont Company following 37 years of service. At the time of his retirement he was senior chemist in the dacron plant's process section in Kinston, N.C. He joined DuPont at Richmond, Va., in 1935 as a spinning operator and was later made foreman and then chemist before transferring to Alabama Ordnance Works in 1942. Later he worked at Yerkes Laboratory at Buffalo, N.Y., and the Seaford (Del.) nylon plant. . . . JAMES J. GUSHAW, who has recently been making his home in Toronto, Canada, and in Long Island and Staten Island, N.Y., is being transferred back to the main offices of Sverdrup & Parcel Consulting Engineers in St. Louis, Missouri. He is a principal engineer and project manager with the company. In June the Gushaws attended their son James' graduation at Stanford University in California.

Miller gets teed off

. L. "JIM" MILLER, '15, is a swinger. Ask nyone at Bob O'Link Golf Club in Highland 'ark, Illinois. At 80 he still breaks 80 out on he fairway, and he does it regularly at Bob)'Link almost every afternoon.

When Miller isn't teeing off, he can be ound working several hours a day at his nsurance office in Chicago's loop. Not be- ause he has to, but because he wants to. im Miller isn't about to give in to anything, ncluding Father Time.

It's that never-say-die attitude that has nade him such a good competitor both in nd out of business. Just eight short years go, at a young 72, he won the 36-hole ualifying medal at the U.S. Golf Associa- on's Senior Championship. Fifteen times e's won the club championship at Bob 'Link and once he played to a scratch andicap for 20 years. He still smiles recall- ig the exhilaration of leading the last four oles in the qualifying round of the Senior hampionship in Portland back in '64.

There are other memories, some not so right. He remembers the embarrassment of riving a ball into the lake at Medinah when e was playing with Johnny Revolta in the .S. Open qualifying event in 1930.

Miller, who is a director of the Chicago District Golf Association and a member of the USGA's handicap committee, has played with the legendary Ben Hogan, Byron Nelson, and Walter Hagan. However, he still takes golf lessons.

"The experts can see what I'm doing wrong when I might not be able to feel it," he says.

On the other hand, he gives instructions, too. Every week he can be found teaching golf at the local Veterans' Administration Hospital. And three times each summer he teaches vets at Hines and Great Lakes.

He admits, though, that he is slowing down a little. His handicap is now approaching eight and a couple of years ago he succumbed to the electric golf cart. Age has finally forced him from participating in the U.S. Amateur Championship, but he still looks forward to his playing dates at the North-South Amateur at Pinehurst, Fred Waring's four-ball event at Shawnee-on-the-Delaware, and the Senior Tournament.

For over fifty years Jim Miller has been out on the greens as well as on the job with New England Life.

"Golf and insurance," he says, "are in my blood."

1936

OHN R. BRAND, director of engineering evelopment at DuPont's Engineering De- elopment Laboratory, has been named a ellow of the American Society of Mechani- al Engineers. (There are only about 1000 ellows in ASME, which has a total mem- ership of 58,000.) Mr. Brand has been ith DuPont for 36 years and during his areer he has made "significant contribu- ons in the fields of processes and equip- ient for manufacture of sporting firearms, hotographic products, synthetic textile bers, and polymeric film."

1937

FRANCIS S. HARVEY has been elected to the permanent board of investment at Bay State Savings Bank in Worcester. . . . IVER T. ROSENLUND works for E. I. duPont de Nemours & Co. at their Chambers Works in Deepwater, N.J.

1938

CHARLES C. BONIN is now chairman of the board at Chemico, New York City. . . . ARTHUR A. DAVIS has been appointed to the staff of the distribution services group at Summerour & Associates, management consultants, in Atlanta.

1939

JOHN M. DRISCOLL was recently elected a senior vice president of Stone & Webster Engineering Corp., Boston. He is responsible for management of the firm's process industries group. This includes engineering, procurement, construction and sales in the United States, Far East, and Latin America. He joined the company in 1970 as a vice president and manager of its process industries group.

1940

HARDING B. JENKINS spent January, February, and March in Manila on an International Executive Service Corps assignment. He found Manila a great place to be during that time of the year, and discovered that the IESC program is an excellent way to get to know and appreciate the problems of a developing nation.

1941

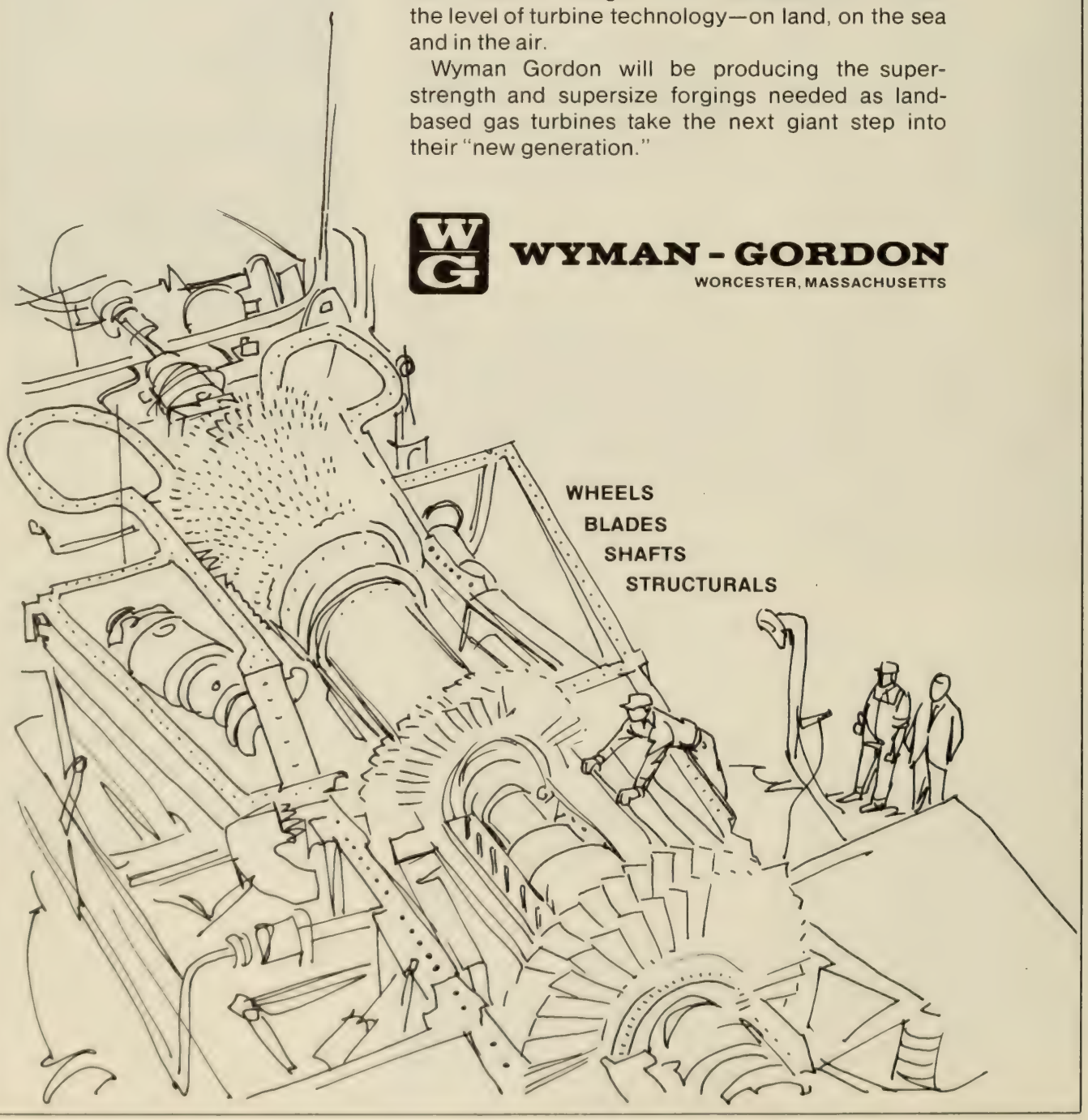
HAROLD E. ROBERTON, JR., who retired as a military meteorologist (Lt. Col.) after 20 years of service, has spent the past 10 years building a new career in the investment field in Spokane, Washington. Recently he was named coordinator of investment counseling for Murphey Favre, Inc., an investment firm. In this new capacity he supervises millions of dollars of investments for the various pension, retirement and endowment funds as well as individual accounts. During his career he has been associated with the U.S. Rubber Co. and the Old National Bank of Washington, where he was head of the investment section.

Forging for the new generation of turbine engines

Wyman Gordon's mechanical/metallurgical skills have allowed designers and fabricators to stretch the level of turbine technology—on land, on the sea and in the air.

Wyman Gordon will be producing the super-strength and supersize forgings needed as land-based gas turbines take the next giant step into their "new generation."

WYMAN-GORDON
WORCESTER, MASSACHUSETTS



Slotnick '53

1944

VILLIAM A. HERMONAT has joined the ales staff of Di Mambro Realty, Rochester, I.H. Previously he was with U.S. Rubber, Vasco Chemical, Sanford, Me., and Fire-tone International. . . . ALFRED F. LARKIN vas recently named vice president-Inter-ational of Rexnord, Inc. He joined Rexnord n 1947 with the Rollerchain division in Vorcester. After holding several production nd management positions, he was assigned esponsibility for the formation of the com-any's first overseas manufacturing opera-on in Italy. Later he was a division manager n Pennsylvania. In 1971 he was elected xecutive vice president of Rexnord-nternational.

1945

OBERT A. STENGARD is in market evelopment at Uniroyal, Naugatuck, Conn.

1946

/ILLIAM G. DALY is now vice-president-perations for Riviana Foods, Inc., Houston, exas. . . . WILLIAM R. GROGAN, Dean of ndergraduate Studies at WPI, has been ected to the Board of Trustees at Bay tate Savings Bank, Worcester. . . . PRES-OTT E. GROUT, formerly assistant pro-ssor of philosophy at Nichols College, udley, Mass., has joined a Worcester gency of the Massachusetts Mutual Life nsurance Co. Previously he was pastor of ne First United Methodist Church in eabody and the Methodist Church in /hitinsville, Mass. . . . DR. ROBERT B. AYWARD has been elected to the Keuka ollege Board of Trustees. He is a registered presentative of DeHaven & Townsend, outer & Bodine. . . . Currently RICHARD I. UNDERWOOD is vice president market-g services, Honeywell, Inc., Wellesley ills, Mass. . . . MICHAEL WACLAWEK is esently associated with Clark Equipment o., Buchanan, Michigan.

1948

RICHARD K. HORNE is a field engineer-machine tools for Cincinnati Milacron in St. Louis, Missouri. . . . ALFRED D. RIGGS has been assigned to handle southern California accounts (aerospace sales) for Wyman-Gordon Co. from the company's San Diego office.

1949

Married: CHARLES C. ALLEN to Mrs. Evelyn Adams on May 12 in Scotia, New York. Mrs. Allen graduated from Eastman School of Music and the University of Rochester and is a piano teacher in Scotia. Mr. Allen is with the G. E. Research and Development Center.

DR. FRANCIS F. CARINI works for Xerox Corporation. . . . ROBERT W. COOK has been employed by Gould, Inc., Cleveland, Ohio. . . . JOHN C. O'TOOLE is the current head of the Worcester County Engineering Department. He joined the department in 1951.

1950

RICHARD CONNELL is engineering manager at W & H Conveyor Systems, New York City. . . . ELI S. SANDERSON currently serves as manager of facilities and services at Norton Co., Worcester.

1952

RICHARD C. BOUTIETTE has been reappointed director of the Wakefield (Mass.) Department of Public Works for another three years. Since going to Wakefield from Reading in 1961, he has achieved national recognition for innovations. His plan for a unique snowplowing school has been adopted by other communities. Previously he was associated with the Massachusetts Department of Public Works and Edward and Kelcey, consulting engineers. A registered professional engineer, he is currently the president of the New England Public Works Association. . . . CASTLE MOORE, JR. works as a regional manager for Fritz W. Glitsch & Sons in Paramus, N.J.

1953

DR. JOHN J. GREGORY has been named director of the cardiopulmonary laboratory at Overlook Hospital in Summit, N.J. Dr. Gregory is board certified in cardiovascular diseases by the American Board of Internal Medicine. He is a Fellow of the American College of Cardiography, American College of Physicians and the American College of Chest Physicians. He is co-author of a classic textbook entitled, *Cardiology—A Clinico-Physiological Approach*. . . . DR. HERBERT SLOTNICK, a chemist at Central Connecticut State College in New Britain, was chosen to participate in a national 10-week summer program which was held at Dominion University-Langley Research Center, Hampton, Va. The program is sponsored by the National Aeronautics & Space Administration (NASA) and the American Society for Engineering Education (ASEE) and is designed to stimulate an exchange of ideas between the participating faculty research fellows and NASA. Dr. Slotnick has received National Science Foundation funding for previous research undertaken at summer institutes. Widely published in professional journals, he also serves on the Scientific Advisory Council of the Talcott Mountain Science Center in Avon, Conn.

1954

PAUL G. GRANFORS is with American Biltrite Rubber Co. B.I.P. Division, Cambridge, Mass.

1955

Married: ROBERT K. NEUNHERZ to Miss Rose Marie Esposito in Lunenburg, Massachusetts on June 23, 1973. Mrs. Neunherz is an assistant professor at Fitchburg (Mass.) State College. Her husband is an executive with Gem Industries.

JOHN C. CALHOUN has been named New England branch supervisor for Cincinnati Inc. Formerly he was with Cincinnati Milacron, Heald Division, Worcester. . . . ROBERT W. GUSTAFSON is a self-employed contractor in South Dennis, Mass.

Stevens '60

1956

JOSEPH A. MARCOTTE now works for American Biltrite Rubber Co., Cambridge, Mass. . . . JOHN A. WAKE, division manager director for Cincinnati Milacron-Heald, is presently located in England.

1957

J. GORDON SMITH works for Litton Technische Werke, Freiburg in Breisgau, West Germany. He, his wife, Janice, and three children, Tina, 10, Gordon, 8, and Gregory, 5, will be living in Germany for two years.

1958

DAVID B. DENNISTON is with Digital Equipment of Australia. . . . RICHARD A. PRATT owns a resort motel in Bolton Landing, N.Y. . . . RICHARD A. HAMMOND has been promoted to vice president of manufacturing at Tempstat Corp., Hinsdale, N.H. Last November he joined the small company which produces temperature and pressure control valves as well as other energy control valves. The firm is planning to build a new plant.

1959

DAVID A. BAREISS is supervisor corporate materials management at Combustion Engineering, Windsor, Conn. . . . WINDLE B. PRIEM, former vice president of Marine Midland Bank, New York, has been named regional director of Region II of the U.S. Small Business Administration with headquarters in New York. He has served as deputy director of the New York region since joining SBA last year. He will now direct SBA's financial, investment, contracting and management programs. . . . CLESSON A. ROBBINS, SIM, has been promoted to frame plant manager for the optical products division of American Optical Corp., Southbridge, Mass. He had been manager of tool rooms and machine shops. He has been with the company for 25 years. . . . DAVID A. SAWIN was recently elected assistant vice president of Worcester Bancorp, Inc. He will be responsible for the refinement of financial controls for the rapidly growing non-banking subsidiaries of Worcester Bancorp. Previously Sawin was controller and personnel manager at Hobbs Manufacturing Co., Worcester, and also had been associated with the Presmet Corp. and U.S. Steel Corp., both in Worcester.

1960

RAYMOND P. ABRAHAM is presently owner of Al Abraham's TV & Appliance Retail Store in Norwich, Conn. He is past president of the Norwich Downtown Lions Club and writes that he is still active in sports, basketball, golf, and baseball. He and his wife, Patricia, have two daughters, Leslie, 11, and Lynn, 8. . . . PAUL A. ALLAIRE has been named director, international operations financial planning and control for Xerox Corp., Stamford, Conn. Since 1970 he has been director, financial planning and analysis, with Rank Xerox, Ltd., a company subsidiary in London. Earlier he was assistant controller, marketing, of the former Business Products Group of Xerox, Rochester, N.Y. . . . PAUL W. BAYLISS was recently appointed director of research administration at Western Electric Company's engineering research center near Princeton, N.J. He joined the Bell System in 1960 and was previously assistant manager of the company's Omaha (Neb.) works. . . . Last summer LAWRENCE J. COHEN was awarded a Juris Doctorate degree as a member of the first graduating class of Western State University College of Law in San Diego, Calif. He earned his degree while attending night school. Currently he is an attorney in San Diego where he is known in the profession as a sole practitioner. Larry writes, "I keep my eyes open for a night-time medical school and if one opens up, I'll make that my next profession." . . . The graduation committee of the class of 1973, Stoneham (Mass.) High School, voted unanimously to have FRANK MATARESE present the diplomas at graduation in June. This method was used to recognize the service he has rendered to the class and community as an outstanding educator. Matarese is assistant superintendent of schools. Previously he served as principal of Stoneham Junior High School. . . . DR. CHARLES A. STEVENS was chosen by graduating seniors as one of the spring semester's outstanding teachers at the College of Engineering, University of Missouri-Columbia. He is an assistant professor of mechanical and aerospace engineering.

1961

Born: to Mr. and Mrs. FREDERICK DUVAL, a daughter, Nicole Michele, on July 13, 1973. Rick is linebacker coach and director of recruiting at the University of Nebraska.

ROBERT R. BEAUDRY is now a highway design engineer for the Federal Highway Administration in Delmar, N.Y. . . . JOHN E. DONNELLY, who received his MS in industrial administration from Union College last year, now serves as unit manager, padmount transformer, General Electric Co., Hickory, N.C. . . . JOSEPH A. MARUBBIO was recently elected an assistant vice president of Con Edison, New York City. He is responsible for purchasing and building services. Earlier he was general manager of construction planning and analysis and project manager for nuclear projects in the utility's construction group. He joined the company in 1962. . . . JOHN W. POWERS has become associated with the Portsmouth (N.H.) office of Wright, Pierce, Barnes, and Wyman as chief sanitary engineer. Formerly he was a project engineer for Tighe and Bond, Holyoke, Mass.; a district sanitary engineer for the northeast division of Naval Facilities Engineering Command, Boston; and assistant sanitary engineer for the New York State Department of Health. . . . JOHN A. QUAGLIAROLI is in market development at First National City Bank, Transaction Inc., Cambridge, Mass. . . . RICHARD E. TAYLOR serves as district manager at Telemation East, Inc., Needham Heights, Mass. . . . JAMES M. TOLOS is with Allendale Mutual Life Insurance Company, Providence, R.I. . . . DR. WILLIAM A. WOLOVICH was recently promoted to the tenured position of associate professor of engineering at Brown University, Providence, R.I.

1962

WILLIAM R. FADO is general manager-western region, at Itel Corporation, Los Angeles, Calif.

1963

JOHN A. McGRATH, JR., is a materials engineer for Blue Rock Industries, Westbrook, Maine.

1964

Married: JOHN R. LONERGAN to Miss Debra A. Doyle in July in Paxton, Massachusetts. Mrs. Lonergan graduated from Worcester State College. Her husband is with the Massachusetts District Commission.

PETER L. DORNEMANN is with National Lead Co., New York City. . . . JOSEPH L. LaCAVA recently received his PhD from the University of Pennsylvania. His major field of study was systems engineering. He is with Bell Laboratories in New Jersey and was a participant in their doctoral support program. He writes that he and DAVID LUBER, '65, who also earned his PhD from the University, are enjoying the challenge of some interesting problems at Bell. . . . THOMAS E. LIZOTTE, SIM, won by a three-to-one majority the vacant city council seat in Ward 5 at a special election held in Marlboro (Mass.) last July. He is a general foreman for Bay State Abrasives in Westboro. . . . ALAN SINCLAIR has been awarded a doctorate of education degree from Boston University, School of Education. . . . MASON A. SOMERVILLE, who received his PhD from Pennsylvania State University last year, is now a senior engineer with Westinghouse at the National Reactor Test Site in Idaho. . . . ANTHONY M. TRIPPI is a partner in Trippi's, Inc., a men's store in Shrewsbury, Mass.

1965

Born: to Mr. and Mrs. DAVID LaRUE, a daughter, Megan Therese, on June 9, 1973. Megan has a brother, Michael, 4, and a sister, Amy, 6. Dave is now general manager at Comfort Air Systems and is located in Framingham, Mass. . . . to Mr. and Mrs. HENRY J. SKONIECZNY, a son, Jonathan Peter, on May 2, 1973.

ROBERT H. JACOBY works as a sales engineer at Superior Plating Co., Fairfield, Conn.

1966

Married: MICHAEL C. NAPOLITANO to Miss Caroline F. Wheeler in Holliston, Massachusetts on July 14, 1973. Mrs. Napolitano is an elementary school teacher in Holliston. Her husband is with Idealab, Franklin, Mass.

GARY DYCKMAN has received his master's degree in civil engineering from Northeastern University, Boston. . . . ROBERT S. LEVINE now serves as manager-quality control for General Electric Co., Cincinnati, Ohio. . . . JOSEPH PASTIC will be working on the island of Guam transportation program for the next two years. . . . JAN W. MOREN is currently studying at Long Beach State College.

1967

Married: CURTIS R. CARLSON and Miss Dudley H. Brown in Rocky Hill, New Jersey on June 16, 1973. Mrs. Carlson is a librarian at the Princeton (N.J.) Public Library. The groom is with David Sarnoff Laboratories, Princeton. He received his PhD from Rutgers last May. . . . EDWARD B. OLSON and Miss Joan M. Alves on June 16, 1973 in Stamford, Connecticut. The bride, a graduate of Berkeley Secretarial School, is an administrative secretary at Stamford Hospital. Her husband is president of Connecticut Data Science, Inc., Stamford.

ROBERT L. DHEIN, who received his master's in electrical engineering from Johns Hopkins last year, is an executive engineer at Motorola, Fort Lauderdale, Fla. . . . ROY C. FEDOTOFF has received a post-master's degree in engineering from Polytechnic Institute of Brooklyn (N.Y.)

1968

Married: FRANCIS P. BARTON and Miss Maureen Ann Gnatek on June 30 in Cumberland, Rhode Island. Mrs. Barton teaches in Quincy. The groom is a graduate student at Northeastern University, Boston.

Born: to Mr. and Mrs. LAWRENCE (JACK) ROGER, a daughter, Michelle, on June 2, 1973. Having completed three years as a Navy officer, Jack is now a doctoral candidate in the Department of Physiology and Pharmacology at Duke University, Durham, N.C.

Currently ROBERT L. BRADLEY is a project engineer with Chrysler Corporation, Detroit, Michigan. . . . NORMAN E. BRUNELL has been awarded a juris doctor degree from Suffolk University. . . . Presently GERARD E. CARON is a computer programmer at John Hancock Mutual Life Insurance Co., Boston. . . . STEPHEN P. DAVIS was co-author of the article, "Radio Telemetry for Strain Measurements in Turbines" which appeared in the April issue of *Sound and Vibration.* He is active in the Instrumentation and Acoustics Section of the Steam Turbine Division at Westinghouse Electric Corp., Lester, Pa. . . . MICHAEL A. DiPIERRO writes that the first location of Auto-Tech, Inc., with which he is associated, opened on July 1, with the second to follow in the Leominster-Fitchburg (Mass.) area this fall. . . . RONALD F. GOLASZEWSKI is a rate analyst for Providence Washington Insurance Company, Providence, R.I. . . . RICHARD E. MAKOHON has received his master's in administrative science from the University of Alabama. . . . EDWARD F. O'HARA is with ITT Grinnell/Pipe Hanger Division, Providence, R.I. . . . SCOTT W. RAMSAY, who received his MBA from the University of New Hampshire this year, is a controller trainee at Mobil Oil Corporation, Scarsdale, N.Y. . . . LYNWOOD C. RICE serves as a senior engineer at Uniroyal Chemical, Geismar, La. . . . STANLEY F. URBANOWSKI, JR., is an electrical engineer for New England Electric System, Westboro, Mass.

1969

Married: DAVID H. JOHNSON to Miss Janifer A. Hunger in Painesville, Ohio, on June 9, 1973. Mrs. Johnson is a medical editor at Mass. General Hospital. The bride-

groom is with the New England Telephone Co. . . . JOHN C. PAYNE and Miss Nancy Adrian on July 14 in Worcester. The bride is a reading specialist at Chaffee School in Oxford, Mass. Her husband is enrolled in the doctor of science program at Columbia University, New York City.

BRIAN T. ABRAHAM is a quality assurance engineer at Western Electric Co., North Andover, Mass. . . . WILLIAM J. BOYAN works for Circle Industries, Bronx, N.Y. . . . THOMAS L. CONNELLY has received a post-master's degree in engineering from the Polytechnic Institute of Brooklyn (N.Y.) . . . RICHARD C. FURMAN is a staff scientist and air pollution engineer at Walden Research Corp., Cambridge, Mass. . . . THOMAS M. GWAZDAUSKAS has received his MBA from Rutgers. . . . MARTIN SURABIAN has been promoted to senior mechanical engineer with the Bechtel Power Corporation, the largest engineer-architect-constructor of nuclear and fossil fuel power plants in the country. He is also working on his MS in nuclear engineering at Catholic University (evenings) in Washington, D.C.

June 10, 1973 in Worcester. Mrs. Cattel, who attended Quinsigamond Community College, is an office manager at Model Cities. Her husband is a field system engineer at Riley Stoker Corp., Worcester.

DONALD F. BOLDUC serves as regional sales representative for Harold F. Bolduc Assoc., Thompson, Conn. . . . JOHN P. KAZINSKAS has been appointed a grade two engineer in the Survey Department in Gardner, Mass. . . . DINKAR V. DESAI was recently awarded a post-master's degree in engineering from Polytechnic Institute of Brooklyn (N.Y.) . . . JOHN J. GALE has been employed by the Holden (Mass.) House and Country Club. . . . JAMES H. GEORGE is in the U.S. Navy. . . . PAUL R. LaPLANTE was recently promoted to the rank of first lieutenant in the Army. He is with the Army Electronics Command's Electronics Technology and Devices Laboratory, Fort Monmouth, N.J. . . . JAMES M. LOCKWOOD is a sales representative for the Industrial Chemicals Division of Allied Chemical Corp., San Francisco, Calif. . . . JETHALAL N. MAKATI works for J & J Corrugated Box Corp., Fall River, Mass. . . . ROBERT G. MERRITT has been awarded an MBA from Babson College, Wellesley, Mass. . . . RAYMOND T. PAJER is employed by the section of physical sciences, Yale University, New Haven, Conn. . . . Presently LOUIS W. ZITNAY is working for his MS in environmental health engineering at Northwestern University, Evanston, Ill.

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1970

Married: DAVID B. BEST to Miss Geraldine A. Ashton on May 20, 1973 in Andover, Massachusetts. The bride has been attending Northern Essex Community College, Haverhill. The groom is with Western Electric Co., North Andover. . . . JOHN D. CATTEL II and Miss Barbara Ann Baris on

1971

Married: FRANCIS J. CALCAGNO and Miss Susan H. Robertson in Spencer, Massachusetts on June 30, 1973. Mrs. Calcagno is a graduate of Salter Secretarial School, Worcester. The groom, who has received his master's degree from Washington University, St. Louis, Missouri, plans to enter a career in investment banking. . . . BARRY CHESEBRO to Miss Patricia Charles on June 23 in Bound Brook, New Jersey. The bride is a learning disabilities specialist in Central Falls, R.I. The groom is a stockbroker. . . . LEO R. GILLIS and Miss Patricia Anne Shaughnessy on June 23 in New London, Connecticut. Mrs. Gillis is a Becker graduate. Her husband is with the New England Power Service Co., Westboro, Mass. . . . WAYNE D. HOLMES and Miss Caroline Amee on May 19, 1973 in Watertown, Massachusetts. The bride is a graduate of Becker and an executive secretary at New England Mutual Life Insurance Co., Boston. The bridegroom is a loss prevention engineer at Factory Insurance Association, Boston.

Married: JOHN C. JOHNSON and Miss Karen Rothfuss on May 19, 1973 in Tribune, Kansas. The groom is a second lieutenant in the U.S. Army Medical Services Corps and is stationed at Fort Rucker, Alabama. . . . MARK A. KORETZ to Miss Ellen S. Rosenberg on June 3 in Brockton, Massachusetts. Mrs. Koretz is in the individualized teaching program of the Amherst (Mass.) Public School System. The groom is employed by Digital Equipment Corp., Westfield. . . . DENNIS J. STABA and Miss Carol J. Kenyon on May 5 in Middletown, Connecticut. A graduate of Becker Junior College, Mrs. Staba is an insurance rater. Her husband is with Close, Jenson and Miller, Wethersfield, Conn.

MARTIN K. ANDERSON is with Wang Labs, Inc., Springfield, N.J. . . . THOMAS R. COPP is presently employed at Simonds Saw & Steel Corp., a division of Wallace-Murray Corporation in Fitchburg, Mass. He works as a research and development engineer. . . . Currently VINCENT PACE is an electrical construction engineer at Philadelphia Electric Co., Philadelphia. . . . DONALD K. PETERSON has been awarded an MBA from the Amos Tuck School at Dartmouth College, Hanover, N.H. . . . JOHN PETRILLO is with AT & T Long Lines, New York City. . . . GREGORY F. SANKEY serves

CHECK OUR SPECS BEFORE YOU BUY THEIR 4 CHANNEL RECEIVER.

	Sylvania	Pioneer	Sansui	Fisher	Harman-Kardon	Marantz
Model	RQ 3748					
Continuous (RMS) Power[1] 4 channels Stereo Bridge	50Wx4 125Wx2					
THD at rated output	<0.5%					
IM Distortion at rated output	<0.5%					
FM IHF Sensitivity	1.9μv					
50 db signal to noise ratio	2.8μv					
Capture Ratio	1.5db					
Price	$549.95[2]					

[1]All power measurements taken at 120 volts/60 cycles, 8 ohms, 20Hz-20kHz, all channels driven simultaneously.
[2]Manufacturer's suggested list price which may be higher in some areas.

If you're in the market for four channel, you already know you've got to spend a good bit of cash for a receiver. So it'd be a good idea to spend a good bit of time checking specs on everything available just to make sure you get the most for your money.

To make your search a little easier, we've prepared the blank comparison chart above with spaces for some of the best-known brands and most important specs. Just take it with you to the store, fill it in, and you'll be able to tell at a glance what you get for what you pay.

We took the liberty of filling in the Sylvania column with specs for our RQ3748 four channel receiver. We did it because we know we're not the best-known name in four channel, and we didn't want you to overlook us for that reason.

Because we think the RQ3748's specs are really worth remembering.

50 watts of RMS power per channel at 8 ohms, 20-20kHz, with all four channels driven. 125 watts per channel in stereo bridge mode. A THD and IM of less than 0.5% at rated output. An FM sensitivity of 1.9 microvolts. A discrete four channel receiver with matrix capabilities so you can use either type of quadraphonic material. And much, much more.[3]

We can offer so much because we have so much experience. We were one of the first in the audio field. And now we're applying all our knowledge, all our engineering skill to four channel.

Once you've proven to yourself which receiver has the best specs, move on down to that last line in the chart and compare Sylvania's price with all the others. Find out which one gives the most for your money.

We feel pretty confident you'll discover that the best-known names aren't necessarily your best buy.

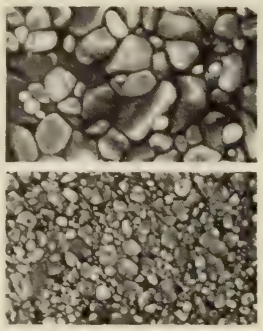
[3]So much more that it won't all fit here. So send us a stamped, self-addressed envelope and we'll send you a four-page brochure on our four channel receivers.

GTE SYLVANIA

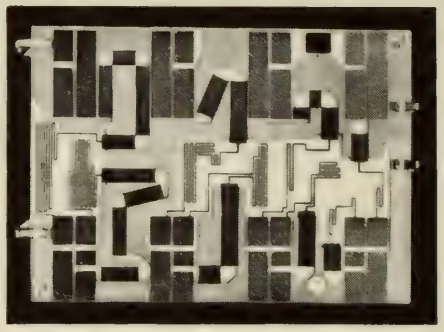
Sylvania Entertainment Products Group, Batavia, N.Y.

WESTERN ELECTRIC REPORTS

1500° C furnace was specially designed to fire these new substrates. The relatively low temperature results in smooth substrate surfaces for practically fault-free thin film bonding.



Electron micrographs show the great difference in grain size between new ceramic material (lower) and the previous material (upper).



Thin film integrated circuit shown here is part of a resistor network. It is one of many that benefit from the improved substrate. Metal leads on sides are bonded by thermocompression to tantalum nitride resistor film.

Smoothing the way for perfect thin film bonding.

Aluminum oxide, or alumina, is considered to have the best combination of properties for thin film circuit substrates. Until recently, however, the bonding of metal elements to gold-coated tantalum nitride resistor film on alumina was somewhat unpredictable.

Now, an advance at Western Electric has made it possible to get practically fault-free bonding of these materials.

This new perfection in bonding came through the development of finer grained alumina substrates.

The process has four basic steps: milling, casting, punching and firing.

During milling, alumina is combined with magnesium oxide, trichlorethylene, ethanol and a unique deflocculant. For 24 hours, this mixture is rotated in a ball mill. In a second 24-hour period, plasticizers and a binder are included.

The deflocculant plays a major role by dissipating the attraction forces that exist between the highly active alumina particles. This prevents thickening, which would ordinarily make an active alumina mixture unworkable.

The 48 hours of milling is followed by casting. When the material comes off the casting line, it is in the form of a flexible polymer/alumina tape, dry enough to be cut into easily handled sections.

After casting, a punch press cuts the material into the desired rectangles or other shapes. Holes can be punched at the same time.

Finally, because of the use of active alumina, the material is fired at an unusually low temperature which results in smooth substrate surfaces for reliable thin film bonding. The finished substrate is then ready for the various processes of thin film circuit production.

In developing this new process, engineers at Western Electric's Engineering Research Center worked together with engineers at the Allentown plant.

Conclusion: This new way to produce substrates is a truly significant contribution for thin film circuit production.

The ultimate gain from this smoother substrate is for communications itself. For through the achievement of nearly perfect bonding of metal leads to tantalum nitride, thin films can be produced with even greater reliability and economy.

Western Electric

We make things that bring people closer.

Troutman '71

s an environmental engineer at Stone & Webster, Boston. . . . JAMES E. TROUTMAN, JR. has been commissioned a second Lieutenant in the U.S. Air Force. He graduated from the School of Military Sciences for Officers at Lackland AFB, Texas. Lt. Troutman, who was selected through competitive examination for attendance at the School, is being assigned to L. G. Hanscom Field, Mass. for duty as a staff engineer in the Electronics Systems Division. . . . DAVID L. WINER is a design engineer with Instrumentation Laboratory, Inc., Lexington, Mass.

1972

Married: MICHAEL P. DiBENEDETTO to Miss Elizabeth A. Weber on June 9, 1973 in Worcester. The bride is majoring in music education at Lowell State College. Her husband is with Stone & Webster Engineering Corp., Boston. . . . DOUGLAS B. HARRINGTON to Miss Carole A. Mahoney on June 30 in Worcester. The bride is a nurse. The groom is with General Electric Co., Lynn, Mass. . . . KENNETH W. KOLKEBECK and Miss Shirley H. Kopchik on June 1973 in Connecticut. Mrs. Kolkebeck, who graduated from Becker and attended the University of Connecticut, is an assistant buyer for Howland's, White Plains, N.Y. The bridegroom is with Johnson Service Co., Long Island City, N.Y. . . . PHILIP QUEIRA to Miss Susan Klanica on July 7 Cheshire, Connecticut. Mrs. Piqueira, a graduate of Anna Maria College, teaches high school English in Southington. Her husband works for Pratt & Whitney, East Hartford, Conn. . . . THOMAS J. TRACY and Miss Maureen O'Mara on June 9, 1973 Uxbridge, Massachusetts. Mrs. Tracy is presently librarian at Uxbridge Public Library. The groom is with Stone & Webster Engineering, Boston. . . . MICHAEL R. WAYNE and Miss Winifred P. Curtis in West Campton, New Hampshire on June 9. The bride graduated from the College of William and Mary in Virginia. Her husband is a student at the University of Vermont in Burlington. . . . RICHARD C. WOLKE and Miss Linda Mae Vautour on June 3, 1973 Clinton, Massachusetts. Mrs. Wolke is a registered nurse. Her husband is employed by the Factory Insurance Association, Raleigh, N.C.

DUNCAN A. CREASER, JR. recently graduated as an honorman from recruit training at the Naval Training Center, Great Lakes, Ill. . . . SAMUEL T. CUSCOVITCH works at Aetna Life & Casualty, Hartford, Conn. . . . LINDA M. DUPONT, who received her MSCS from WPI this year, serves as a scientific programmer/analyst at Morgan Construction Co., Worcester. . . . MARK FRITZ is an educational consultant at North Country Learning Center, Jefferson, N.H. . . . NEIL C. HERRING is a self-employed freelance consultant and urban and regional planner in Fairlee, Vt. . . . TIMOTHY F. LASKOWSKI received his MSEE from WPI in June and is currently an application engineer with Power Technologies, Inc., a consulting firm based in Schenectady, N.Y. . . . ROBERT L. LYONS serves as field service engineer for Digital Equipment Co., Maynard, Mass. . . . EDWARD G. PERKINS is a systems programmer for WACCC at WPI.

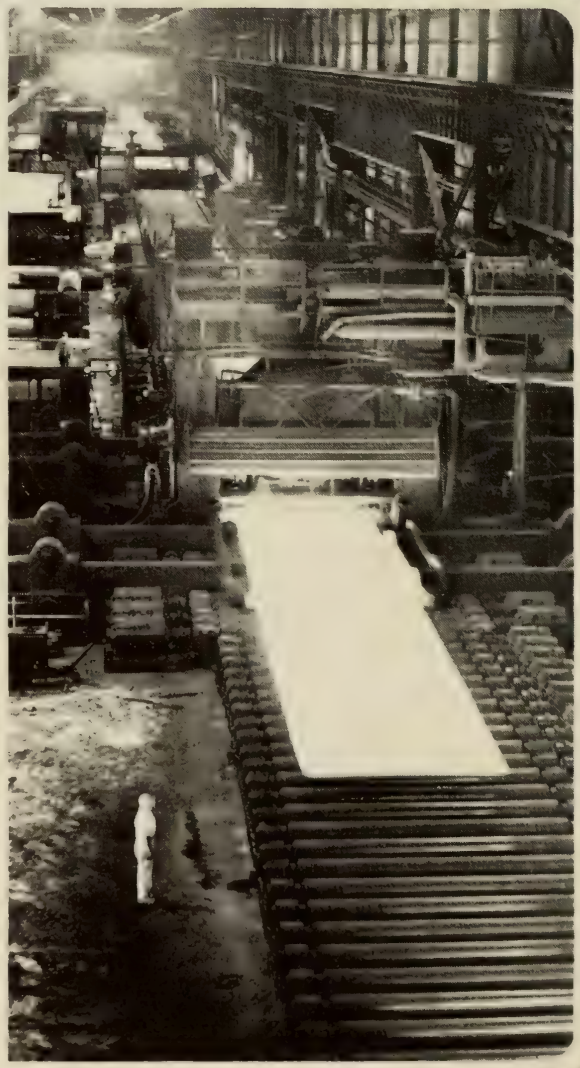
1973

Married: STEPHAN D. BATCHELDER and Miss Signe Warpness on May 28, 1973 in Riverton, Wyoming. Mrs. Batchelder attended Central Wyoming College and the University of Idaho. The groom is a premedical student at the University of Idaho. . . . RICHARD BIRKENSHAW to Miss Cynthia DeMarco on June 23, 1973 in West Roxbury, Massachusetts. The bride graduated from Boston State College. The groom is studying environmental engineering at MIT. . . . JOHN E. DEWAR and Miss Christine C. Wyman on June 23 in Lisbon Falls, Maine. Mrs. Dewar graduated from Becker and attended the University of Maine. Her husband is with the Federal Highway Commission in Augusta, Me. . . . MICHAEL J. FAZIO to Miss Louise H. Jackman on July 7, 1973 in Bristol, Connecticut. The bride graduated from Becker Junior College. The bridegroom is a chemist with Dow Chemical Co., Midland, Mich. . . . EDWARD S. JAMRO to Miss Joyce Rock on July 14, 1973 in Worcester. Mrs. Jamro is a graduate nurse. Her husband is a graduate student of environmental engineering at the University of Massachusetts in Amherst.

Married: STEPHEN JOHNSON and Miss Joanne Amato on June 16, 1973 in Wethersfield, Connecticut. Mrs. Johnson, a Becker graduate, is employed at Manchester Federal Savings & Loan. The groom is with Public Service of New Hampshire. . . . Miss DEBORAH F. LaPLANTE and STEPHEN H. GOODWIN on June 9, 1973 in Webster, Massachusetts. The bridegroom is employed by Niagara-Mohawk Power Co. in Albany, New York. . . . ROBERT S. LEACH to Miss Susan Chause on June 9, 1973 in Connecticut. Mrs. Leach graduated from Becker. Her husband is employed in process technology by the Monsanto Corp. . . . ROBERT A. MANES to Miss Nancy E. Walsh on July 21 in Shrewsbury, Massachusetts. The bride is a graduate of Becker Junior College. The bridegroom is studying for his MA in English at Purdue University in Indiana. . . . DANIEL H. MURKLAND to Miss Carolyn D. Barnard in Worcester on May 12, 1973. Mrs. Murkland attended WPI and is an accounting supervisor at Mechanics National Bank. Her husband is employed at Kelley Chandler, Inc., in Worcester. . . . RICHARD R. NABB and Miss Wendy A. Jerome on June 16, 1973 in Warwick, Rhode Island. The groom works for Clairol, Inc., Stamford, Conn.

Married: 2/Lt. WILLIAM A. RUTHERFORD and Miss Vicki L. Swartz in Fort Plain, N.Y. on June 4, 1973. Mrs. Rutherford is a medical secretary. Her husband is at Ft. Belvoir, Md., and will be stationed at Ft. Hood, Texas, following his army training. . . . RICHARD L. SARGENT to Miss Dianne M. Lamberto on June 17 in West Boylston, Massachusetts. The bride attended Worcester Art Museum School and WPI. The bridegroom is a process engineer for Sylvania in Danvers, Mass. . . . THOMAS M. SAVAGE to Miss Marguerite B. Falcone on June 23 in Worcester. Mrs. Savage was formerly an X-ray technician at Fallon Clinic. Her husband is a chemical engineer for Uniroyal, Inc. in Connecticut. . . . DINESH S. SHAH and Miss Donna M. Manganello on May 5, 1973 in Shrewsbury, Massachusetts. The bride is studying at Worcester State College. The bridegroom is a design engineer at Warner & Swasey, Worcester. . . . JOHN J. STRAZIE to Miss Susan Karpawich on June 10 in Worcester. The bride, who is an elementary school teacher, graduated from Anna Maria College. The groom is an assistant planner with Stone & Webster Engineering, Boston. . . . TIMOTHY K. SUTHERLAND and Miss Diane C. Angelastro in June in Riverside, Connecticut. Mrs. Sutherland is a teacher. Her husband is at Manhattan College.

supertankers, sure!



We design and build them. And we also roll the steel plates they're made from.

Bethlehem has lots of projects "on the ways"—not all are related to shipbuilding. And there are plenty of opportunities for engineers to launch meaningful careers.

We need a good crew to keep moving full speed ahead—in shipbuilding and ship repair work, in ship engineering and design; in production supervision, in quality and process control assignments in our steel plants; and in many other technical areas. Why not explore *your* chances of signing on with Bethlehem?

Watch for our recruiter's visit. Meantime, pick up a copy of our booklet "Bethlehem Steel's Loop Course" at your placement office. Or write: Director—College Relations, Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL

an equal opportunity employer

Married: DOUGLAS H. TARBLE to Miss Lynn Marie Goudreau on June 9, 1973 in Woonsocket, Rhode Island. The bride graduated from Jo-An's School of Beauty Culture in Providence. The bridegroom is with Clairol Manufacturing Co., Stamford, Conn. . . . STEPHEN F. TURO to Miss Cheryl L. Cote on June 23 in Paxton, Massachusetts. Mrs. Turo, a special education teacher, graduated from Anna Maria College. Her husband is with Uniroyal Chemical, Inc., Naugatuck, Conn. . . . JOHN A. WILLIAMS, JR., and Miss Nancy L. Carlson on June 16 in Worcester, Massachusetts. The bride graduated from Worcester State College. The groom is a flight officer in the U.S. Navy and is stationed at Pensacola, Fla. . . . Miss CATHRYN H. ZAWISLAK to THOMAS P. DAGOSTINO on June 10, 1973. The Dagostinos are located in Los Angeles, Calif., where the groom is a national service manager at Scientific Audio Electronics.

WILLIAM F. ABBOTT is a programmer for Commercial Union Gas in the Mass. Merchandising Dept., Boston. . . . ROBERT E. KIE works for Harris Intertype, a division of The Cottrell Co., in Connecticut. . . . OBERT M. ANDEL serves as an assistant ngineer at United Illuminating Co., Bridgeort, Conn. . . . LOUIS J. BARBIERI is with tone & Webster, Boston. . . . CONRAD J. ARANOWSKI works as an electronics ngineer for Powercube Corp., Waltham, Mass. . . . ROBERT E. BARON is a student in he chemical engineering department at MIT. . . . IBM Corp., East Fishkill, N.Y., emloys JOHN W. BARRY as a junior engineer. . . THOMAS BECKMAN is a second eutenant in the U.S. Army. . . . DAVID C. EDARD serves as a second lieutenant in he army. . . . CARL BERGMAN is an airman vith the Air Force at Keesler AFB. . . . VILLIAM A. BIRKEMEIER is a graduate tudent in ocean engineering at the Univerity of Delaware in Newark.

SCOTT R. BLACKNEY is studying for his naster's degree at WPI where he has reeived a teaching assistanceship. Last ummer he served as activities director at Camp Resolute in Bolton, Mass. . . . JEFREY E. BLAISDELL has been employed in he Estimating Department of George B. H. Macomber Co., Brighton, Mass. . . . NORA LUM is currently employed as an engineer n the environmental division of Stone & Webster Engineering Corp., Boston. . . . ONALD K. BOHLIN has been hired as a upervisor for American Telephone & Teleraph Co., White Plains, N.Y. . . . CHARLES R. BOWER works as a design engineer for Pratt & Whitney, East Hartford, Conn. . . . WILLIAM C. CARTON is with Teradyne, Inc., Boston. . . . RAYMOND F. CHERENZIA works for Metcalf & Eddy, Boston. . . . PAUL R. CIACCIO serves as chief chemist at Economy Laboratories, Charlestown, Mass. . . . DAVID P. CIRKA is assistant engineer, Northeast Utilities, Hartford, Conn.

WILLIAM E. CORMIER is a graduate teaching assistant at WPI . . . DR. ALI CULFAZ serves as an instructor at Middle East Technical University, Ankara, Turkey (on leave). . . . VIJAYKUMAR A. DAMLE is studying at the University of Minnesota Business School in Minneapolis. . . . JAMES W. DAVIS works as a management trainee with Chicopee Manufacturing, Chicopee Falls, Mass. . . . THOMAS W. DESHEFY is an assistant structural engineer at Ebasco Services, New York City. . . . This fall RALPH E. DESMOND will be attending Syracuse University Graduate School where he will be a teaching assistant. . . . THOMAS M. DiFRANCESCO, project engineer, works at Niagara Mohawk Power Corp., Albany, N.Y. . . . WILLIAM S. ELLIOTT has accepted a field engineering position with General Electric's Installation and Service Engineering Dept. (I&SE) in Schenectady. The department offers the technical assistance for installation, adjustment, testing, start-up and a full range of management, planning and engineering services on GE mechanical, nuclear, electrical and electronic equipment as supplied to defense, industry, and electric utility customers. Elliott is with the overseas section. . . . JAMES V. ELLIS is a graduate student at the University of Tennessee. . . . DEAN H. ELLSWORTH, SIM, is systems analyst and programmer for Worcester Controls Corp., West Boylston, Mass.

PAUL K. ERICSON serves as a designer with Van Zelm, Heywood and Shadford, West Hartford, Conn. . . . Capt. ROBERT H. EVANS, U.S. Army, Field Artillery, is an assistant professor of military science at WPI. . . . JON W. FRANSON works as an underwriter for Factory Insurance Association, Hartford, Conn. . . . TIMOTHY A. FRENCH has been employed by the Photo Products Department of E.I. duPont de Nemours, in Sayreville, N.J. . . . BRIAN S. GUPTILL is with Sylvania Co., Needham Heights, Mass. . . . MERVYN L. HAMER is with the Peace Corps, Kingdom of Tonga, South Pacific. . . . HERBERT J. HEDBERG has joined Texas Instruments Motor Controls Division, Attleboro, Mass. . . . CHARLES M. HENRICKSON has joined the Manufacturing Management Program at General Electric Co., Fitchburg, Mass. . . . TIMOTHY M. HIGGINS works for Teradyne, Inc., Boston. . . . JOHN J. HOMKO has been employed as a technical writer at Data General Corp., Southboro, Mass. . . . STEVEN R. JAFFE is a junior engineer at Hamilton Standard, Electronics Division, Windsor Locks, Conn.

jamesbury
manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves
Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

. . . ROGER T. JAMES serves as assistant manager of F. W. Woolworth Co., Burlington, Vt. . . . BRUCE KERN worked last summer for the Inter-Faith Flood Recovery Committee in the Wilkes-Barre area. . . . JOSHUA O. KOLAWOLE is a field engineer with G.E.'s Installation and Service Engineering Dept. which is headquartered in Schenectady, N.Y. He attended a two-week basic course and is now receiving further training at the department's Field Engineering Development Center and in the field. . . . DONALD E. KOSKI is with Metcalf & Eddy, Inc., Boston.

ROBERT J. KOWAL is a junior engineer for IBM, East Fishkill Facility, Hopewell Junction, N.Y. . . . FREDERICK J. KULAS works as a manufacturing management program trainee at General Electric Co., Schenectady, N.Y. . . . JOHN A. KULIG has been hired by Babcock & Wilcox Co. . . . THOMAS J. LANDWEHR is a programmer analyst at Raytheon Corp., Waltham, Mass. . . . EDOUARD E. LANGLOIS, JR. is associate engineer at Xerox Corp., Webster, N.Y. . . . MARK H. LAWRY has joined the Rotating Engineering Advancement Program at General Electric Co., Ordinance Systems Division, Pittsfield, Mass. . . . JOHN H. LECKO is a graduate student at WPI. . . . Currently CLAUDE L. LEMOI is in the Manufacturing Management Program at General Electric Co., Lynn, Mass. . . . ROBERT F. LEVI has accepted a position with Carrier-Transicold Co. in Syracuse, N.Y. as a service engineer. . . . KENNETH P. LEVY is an electrical salesman for Lutron Electronics Co., Inc., Coopersburg, Pa. . . . DAVID LIGEIKIS holds the post of junior engineer at the New York State Dept. of Transportation in Binghamton. . . . TERRENCE P. LUDDY has been employed as an assistant engineer at Northeast Utilities, Hartford, Conn. . . . JOHN J. LUIKEY, JR. is assistant superintendent of the machine shop at U.S. Steel Corp., Worcester, Mass. . . . JOSEPH LUSZCZ has accepted a position with Hewlett Packard, Waltham, Mass. . . . PETER B. MARTIN works for Mobil Research & Development, Paulsboro, N.J. . . . STEPHEN S. MARTIN is a doctoral candidate at the University of Rochester (N.Y.)

WILLIAM H. MAWDSLEY is an actuarial student at State Mutual Life Assurance of America, Worcester. . . . MICHAEL D. McCORMICK is a marketing engineer in G.E.'s Industrial and Power Capacitor Division, Hudson Falls, N.Y. : . . ROBERT H. NEWMAN serves as a programmer trainee at The Travelers, Hartford, Conn. . . . ALDEN PALMER is working toward his master's degree in mathematics at the University of Connecticut in Storrs. . . . PHILIPPE R. PELTRE is a graduate student in the Chemical Engineering Department at WPI. . . . GWYNNE PETERSON has been accepted as a management trainee at AT & T Long Lines, New Haven, Conn. . . . EINAT H. PILZER is a mechanical engineering student at MIT. . . . ALBERT P. POPOLI works for Stone & Webster, Hydro-electric Power Division, Boston. . . . DANIEL H. PRIOR is a field engineer with New England Electric System, Worcester. . . . THOMAS E. RADICAN is a graduate student at the University of Rhode Island. . . . LEONARD E. T. REDON has been employed by Eastman Kodak Co., Rochester, N.Y. . . . RAND J. REFRIGERI has joined Riley Stoker, Worcester. . . . MARTHA L. RYAN has been working as a clerk-typist in the Building and Grounds Department this summer and is now a WPI Graduate Student. . . . STEPHEN P. SCHNEIDER has accepted a job as a research assistant with the Worcester Foundation for Biological Research, Shrewsbury, Mass. . . . JAY J. SCHNITZER is a graduate student at MIT. . . . MORIS SCHUSTER'S business address is Apartado Aereo 1299, Barranquilla, Colombia, South America.

WAYNE E. SCHWEIDENBACK is with Stone & Webster, Boston. . . . CHARLES P. SCOPELITIS is in the construction support section of Electric Boat Division, New London, Conn. . . . WARREN F. SMITH serves as a project planner at Armstrong Cork Co., Lancaster, Pa. . . . RICHARD F. SOCHA works for Western Electric Co., North Andover, Mass. . . . C. STEPHEN SZLATENYI, JR. is attending Albany Medical School. . . . THOMAS S. SZATKOWSKI is with Mobil Research and Development Corp., Paulsboro, N.J. . . . PAUL J. TASSINARI is a graduate student at WPI. . . . KENNETH R. THERRIEN has been employed as a field service engineer with Hamilton Standard, Windsor Locks, Conn. . . . BENJAMIN R. THOMPSON is manager outside administrative services, WACCC, Gordon Library, WPI. . . . ANGELO P. TSEFREKAS, who received his master's degree in Engineering Science and Management from WPI in June, is now on the administrative staff of Framingham (Mass.) Union Hospital in the area of hospital management. Formerly he was employed at the Bendix Corporation, Sturbridge, as manager of industrial engineering. . . . SHEAN-CHENG TSOU is studying for his doctorate at WPI. . . . DAVID C. WASON is studying for his PhD in computer science at Yale. . . . DAVID WILLIAMSON works for Sperry Systems Management Division (Sperry Rand Corp.), Great Neck, N.Y. . . . ROBERT A. WITZGALL works for Metcalf and Eddy, Boston. . . . NANCY E. WOOD is with Stone & Webster, Boston. . . . RAYMOND L. WOOD is a computer programming trainee at The Prudential Insurance Company, Newark, N.J.

It's not too early to
mark your calendar

REUNION

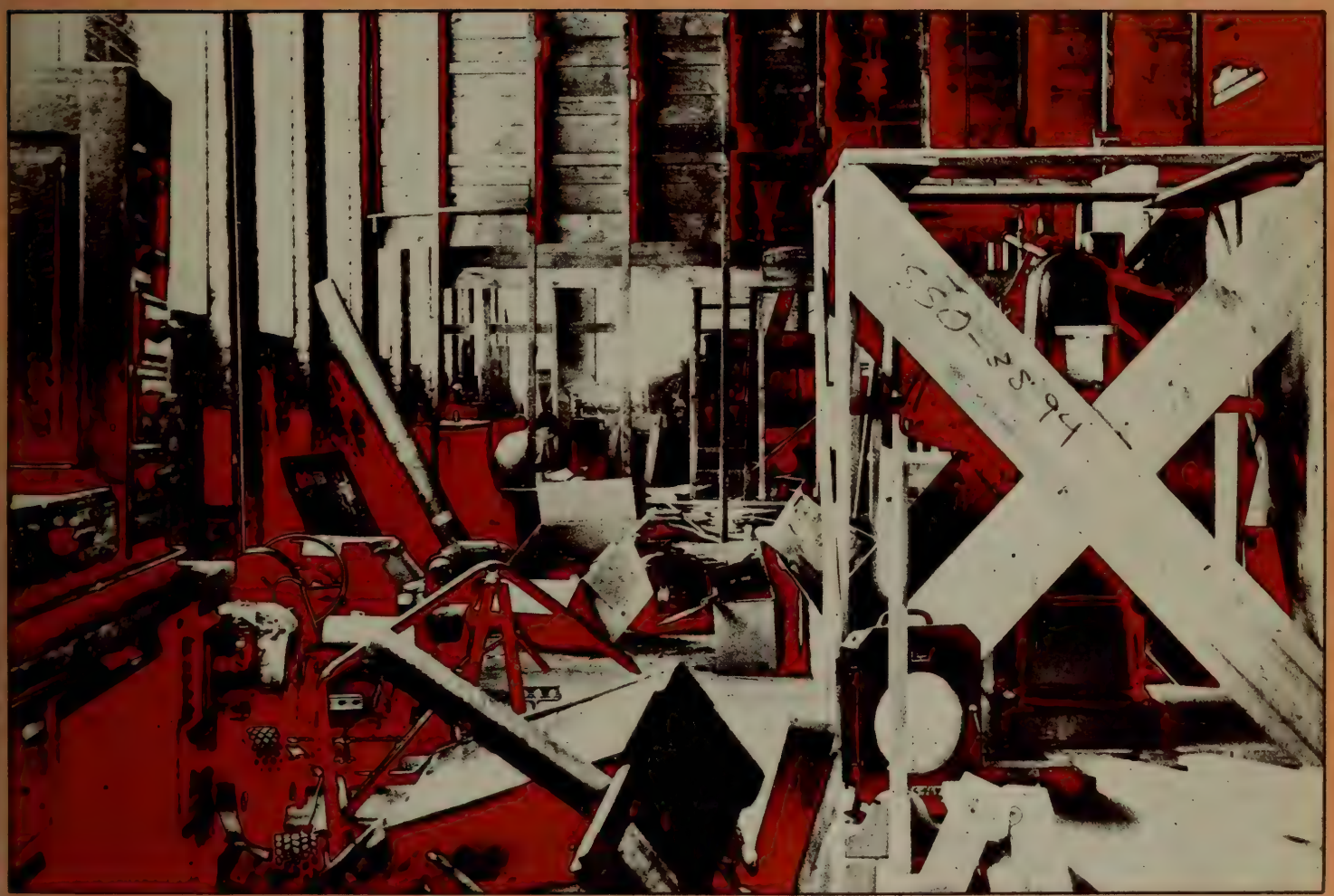
June 8, 1974

I believe that order is better than chaos, creation better than destruction. I prefer gentleness to violence, forgiveness to vendetta. On the whole I think that knowledge is preferable to ignorance, and I am sure that human sympathy is more valuable than ideology.

Sir Kenneth Clark

December, 1973

WPI JOURNAL



What would you do with this mess?

We get people talking.
(To 23,000,000 people we're the telephone company)

We entertain them.
(Sylvania color TV and stereo)

We brighten their lives a bit.
(Sylvania lighting for home, industry and photography)

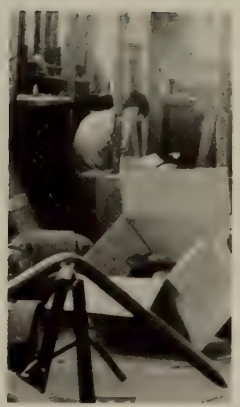
We're GTE...
(a growing concern for your growing needs)

General Telephone & Electronics, One Stamford Forum, Stamford, Conn. 06904

WPI JOURNAL
Vol. 77, No. 4 December, 1973

6 **The IQP Center story, etc.**
An old attic is turned into a center for student-faculty project work, but the transformation wasn't the usual draw-up-specs-and-let-it-out-for-bids kind of construction project. No sir.

14 **Message from the Middle East**
Chemical engineering's food-and-garbage man at WPI, Al Weiss, is on the move again, and this time he finds himself in the middle of a war zone.



Departments

2 campus news
4 feedback
16 Your class and others
22 Completed careers

The Cover: A photographic representation of the attic in Washburn less than a year ago. For an up-to-date look, see the article beginning on page 6.

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, Chairman; Donald F. Berth, '56; Richard DeChard, '56; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography and printing: Davis Press, Worcester, Massachusetts.

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1973 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. Postmaster: Please send form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

WPI Alumni Association

President: W. J. Bank, '46

Vice Presidents: L. Polizzotto, '70; F. S. Harvey, '37

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr., '44

Executive Committee Members-at-Large: C. W. Backstrom, '30; B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55

Fund Board: R. F. Burke, Jr., '38, Chairman; W. J. Charow, '49, Vice Chairman; L. H. White, '41; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

campus news

Look what $3 buys

While browsing through some old pictures at the Princeton (Mass.) Flea Market recently, corporate relations director Barry Bornstein did a doubletake. Amid the moldering prints and photographs he was looking at the WPI diploma of George Crompton Gordon, '95, who donated (through his estate) Gordon Library which climbs up the east side of the hill.

Bornstein asked the price of the item and was told $3.00; the seller asked whether he was interested in the frame. Waiting until he had handed over the money, Bornstein replied: "Well, you see, I work for WPI, and nine years ago this man died and left us *five million dollars* to build a library. No, I'm not interested in the frame."

The Gordon diploma, cleaned up and reframed, is now housed in the Institute archives. In addition to its association with Gordon, the diploma is one of the few documents in our possession with the signature of Stephen Salisbury, first president of the college.

Getting the word around campus

One of the big problems around WPI for a number of years has been the lack of communications—between departments, between administration and faculty, between students; it hardly seemed like anyone was talking with anyone else. Two new avenues for keeping people in touch with one another have been started this year, and they seem to be helping enormously.

One is *Monday Memo*, a weekly internal newsletter designed to transmit the little details of life in the WPI faculty and staff: who's doing what, speaking when, going where, what's up. It sums up meetings and reports changes in curriculum, personnel, policies, phone extensions, etc. It is replacing much of the flood of short, general-distribution memos that used to inundate everybody, too. The initial Monday Memo said that if it wasn't doing the job it would self-destruct in eight weeks or so. The eighth week has just passed, and it seems healthy and useful.

Another innovation is audiovisual director Ken Scott's cable TV system. It flashes a succession of short announcements (ranging from notices of World Series coverage, through project opportunities, to student committee messages) through a closed-circuit system. Monitors are located in the student lounge in Daniels, the library, the IQP Center in Washburn, the Computer Center, and Olin Hall of Physics. The messages run from 10:30 a.m. to 4:30 p.m. The system also carries selected special programming—videotapes made in the TV studio in Higgins, and network programs such as Monday Night Football, presidential speeches, and the recent flood of news conferences by government officials (and ex-officials).

University Relations staffer Barry Bornstein with the Gordon diploma he rescued from obscurity in a local flea market bin. He is standing in the main entrance area of the Gordon Library before the portrait of George C. Gordon.

Yes sir—I mean ma'am

The Army ROTC program on campus just signed up its first women students. The five include three freshmen, one sophomore, and a freshman from Assumption College who enrolled under the cross-registration

provisions of the Worcester Consortium for Higher Education.

According to Col. James Kennedy, head of the WPI program, this represents a quick implementation of a new national policy authorized this summer by Army brass. Previously, women had been admitted into ROTC programs at ten schools scattered throughout the country. This had been an experimental program, and was limited to colleges which had some sort of "women's auxiliary" already existing. The experiment proved successful, and students and Army personnel were happy with the female additions, hence the decision to go ahead at all 292 ROTC institutions.

"Once we had the first woman," says Capt. William Brethorst, "getting the others wasn't too hard. But recruiting at first was a real hassle. We had to dispel a lot of stereotypes, and we had to reassure them about the three weekend programs we hold at Fort Devens every year. They get to stay with female officers, not in the regular barracks."

The women students are eligible to compete with all other ROTC students for Army scholarships.

Students demand action—the snack bar gets cleaned up

What with all the remodeling going on in Daniels Hall this past year and the construction of a connecting link between Morgan and Daniels, the campus snack bar has been something of an orphan. Last winter it was moved to the lower level of Sanford Riley, off the always-dark lounge area. It wasn't exactly a high-traffic location, but everyone conceded it was only temporary until a new, permanent home could be found in the Wedge (the section linking Daniels and Morgan Halls, inevitably so-called because of its shape).

The newly refurbished snack bar in Riley during the lunchtime rush hour.

But you know how it is with temporary housing. The snack bar got neglected. With a bunch of odd-lot, beat-up furniture scrounged from its previous location and who knows where else, in a dingy room where the ceiling pipes were exposed—and festooned in places with cobwebs—it just didn't seem to be the kind of place in which you really enjoyed eating your 60¢ hamburger.

WPI Newspeak, the weekly student newspaper that used to be called *Tech News,* mounted an editorial campaign to get the place cleaned up. For a few weeks nothing much seemed to be happening. Who listens to the *Newspeak* after all?

But one Monday morning you walked into the snack bar, and Lo and Behold! The floor had been repainted (why always gray?), the walls washed, the furniture replaced, and the prices unchanged.

Who says students don't get heard?

Trivia

It has recently been called to our attention that there are 9,547 panes of glass in the Higgins House.

Association seeks WPI trustee nominations

Two years ago, at the June 1972 annual meeting of the WPI Alumni Association, among the articles approved in the revisions to the Constitution and By-laws of the Association was one which formed a Trustee Search Committee of the Association. The committee is composed of five members representing five decades of alumni and they are charged with the responsibility of recommending annually to the Alumni Council the name of at least one alumnus for each alumni vacancy which exists on the WPI Board of Trustees. The Alumni Council makes the decisions on the candidates to be nominated for the positions on the Board and forwards the nominations to the Board for election.

For approximately fifty years, the Board of Trustees of WPI has granted to the Alumni Association the privi-

lege of recommending to the Board three candidates per year for positions on the Board. Thus there are always fifteen Alumni members serving on the Board as Alumni Term Trustees. These candidates, when elected by the Board, serve for a term of five years and may be re-elected once.

In June 1974, John E. Hossack '46, Dr. Edward R. Funk '46 and Albert M. Demont '31 will be completing their terms on the Board. Mr. Hossack and Dr. Funk are eligible to be re-elected.

There are two distinct ways in which alumni may participate in the selection of alumni members of the Board of Trustees. First is the actual proposal of the alumnus to the Alumni Council for consideration for an Alumni Trustee position. As stated in the By-laws of the Alumni Association, the mechanics of proposal are three-fold. Alumni chapters may propose candidates to the Alumni Council by submitting a signed proposal, together with a statement by the candidate of his willingness to serve, to the Trustee Search Committee. This proposal must contain at least fifteen signatures of chapter members. Another method is for any group of at least 25 alumni to propose a candidate by submitting a signed proposal, together with a statement by a candidate of his willingness to serve to the Trustee Search Committee. For 1974 these proposals must be received by the Trustee Search Committee in care of the Secretary-Treasurer of the Alumni Association on or before February 15, 1974. The third method in which candidates may be formally proposed is by the Trustee Search Committee itself, which has the responsibility of proposing to the Alumni Council at least one candidate per vacancy each year. Notice is hereby given that petitions for proposing alumni for positions on the Board of Trustees are now being received and can be received by the Alumni Secretary-Treasurer at any time up to and including February 15, 1974. Sample forms for the proposal of candidates are available from the Alumni Secretary-Treasurer upon request.

The second way for alumni to participate is by suggesting names of alumni to the Trustee Search Committee for consideration. This is an important input of candidates' names to the committee and in turn they will be researched and involved by the committee as it is deemed appropriate. It is the hope of the committee that a large reservoir of potential candidates who should be considered and who would be honored by this consideration can be developed. Please contact any member of the Committee with such names or submit the names to Stephen J. Hebert '66, Alumni Secretary-Treasurer, c/o WPI Alumni Office.

Committee: Francis S. Harvey, '37, Worcester, Ma., C. Eugene Center '30, Pittsburgh, Pa., William J. Hakkinen '70, Ledyard, Ct., William A. Julian '49, McLean, Va., George E. Saltus '53, Boulder, Co.

feedback

Letters to the editor are welcome. All points of view can find a forum in this section, and we encourage the exchange of ideas and opinions here. For reasons of space, variety, timeliness, and interest to other readers, we may not publish all letters received and will occasionally excerpt portions of letters, but those that do appear here are an accurate reflection of our mail.

Alpha & Omega— 'downright embarrassing'

I have read some—but not all—of the de Rhodas' article in the August '73 *WPI Journal.* It is always useful to break new ground by publishing such material in an unexpected locale, but in this case the material appears to be particularly unmatched to the audience. It is a bit like presenting an analysis of *Finnigan's Wake* to a plumbers' convention. Only in this case it strikes me that the material presented is not at a sufficiently sophisticated level to appeal to more than an insignificant minority of Tech graduates.

After all, what do we have here? After the foggy English and seemingly purposeful obscurantism is surmounted, one is appalled at the simple faith in ESP, UFO phenomena, and the significance of tales of precognition by Bulgarian ladies—items that are the standard bill of fare in any railway station astrology magazine. For a body of intelligent men and women with a firm training in the physical sciences and statistics, it must be downright embarrassing to have the naive faith of the de Rhoda duo so thrust upon them.

May I suggest that readers of the piece who were rather floored (as I

was!) by the verbiage—which reminded me uncomfortably of a literal translation of Kant—may get some frustration-relief by turning to a simpler text that covers much of the same material. I refer to Martin Gardner's delightful book *Fads and Fallacies in the Name of Science,* a readily available Dover paperback. But if you want to keep the faith, baby, stay far away from Mr. Gardner's book.

One last point. In the third paragraph of their piece, the authors imply that it is desirable that "all conflict will cease." I suggest this is nonsense—but that is a philosophical difference, and one that might be profitably debated in future issues of the *WPI Journal.* But in English, please!

David Todd
Professor of Chemistry, WPI

Wants more

It has been my good fortune to have had several private conversations with the de Rhodas in addition to listening to a more formalized presentation of their theory given here in Springfield a few months ago. I feel that both the Institute and you are to be congratulated for publishing this article and would certainly subscribe to a continuation of the dialogue between author and reader in future issues of the *Journal.*

George H. Robillard, Jr.
Springfield, Mass.

'The Universe has blessed you . . .'

You will soon be publishing the "Alpha and Omega" theory by Andreas and Annette de Rhoda.

I have known Andreas and Annette for many years and they have had a wonderful influence on my life. The Universe has blessed you for having the foresight to publish their theory.

James Haller
Portsmouth, N.H.

'However complex'

With all possible concentration I read the article by Andreas and Annette de Rhoda in the *WPI Journal,* and I can best express my feelings in the words of a person unknown to me—"There is no subject, however complex, which if studied with patience and intelligence, will not become more complex."

Since the de Rhodas believe the future to be unalterable, it is encouraging that they also believe a thermonuclear holocaust is not possible. I am passing the magazine along to two of my more erudite friends.

Cordially,
Alpha Biocomputer
Niagara Falls, N.Y.

'I never would have known . . .'

I found "The Theory of Alpha and Omega on Planet Earth" a fascinating article, and just this past week have found two people who made remarks about the Humanness of life, and the leap, and I never would have known what they were talking about if I hadn't read this article. One is a minister and the other a nun, and I'd like very much to be able to give them this article to read, but don't want to lose my own.

I read the *Journal* from cover to cover. Sorry we missed our 35th Class Reunion but hope to make the 40th if all goes well.

Doris V. Cloues
(Mrs. Richard W., '38)
Millbrae, California

Can't see our name

Who is responsible for the very diminutive WPI on the covers of recent WPI Journals? Why so modest? The name Journal is not unique—lots of Journals come in my mail and it is hard to sort them if the leading name doesn't stand out. The little WPI reminds me of the tiny signature of President Ralph Earle on my diploma —not a John Hancock to be sure.

Carleton F. Maylott, '26
Williamsville, N.Y.

Up until spring of 1971, the official title of the magazine was The Journal of Worcester Polytechnic Institute, *but even then the name of the school was in relatively small type—no more than one-eighth the size of* Journal. *Since then our title has been* WPI Journal, *and it has existed in two different graphic forms. In both recent logos the* WPI *has been quite small, primarily because doing that provided a pleasing visual solution to the design problem. But obviously a pretty face is not enough, and a number of readers have echoed Mr. Maylott's words in their comments on the questionnaire which was included in the August issue. This has also been mentioned in recent professional critiques of the magazine.*

So we are going to change the Journal's *nameplate once more. The new version, which will not hide WPI's light under a bushel of journals, should make its appearance with the February issue.*

The IQP Center story

(What's an IQP?)

or,

Have I got a project for you !?!

or,

The saga of how ME Prof. Ray Hagglund became first wrecker, then planner, and finally builder, all to transform an unused attic dump in Washburn into a bright, sparkling area for student and faculty project work aimed at applying technological

skills to the solution of social problems; together with case histories of selected student projects showing the WPI Plan (surely you know what that is by now) in operation.
Gesundheit.

by Ruth Trask

The ancient third floor storage attic in Washburn was nothing short of a total disaster. Dust an inch thick covered everything in sight. An ugly, full-sized paint house filled one corner. Dim, outmoded industrial lighting fixtures dangled from the ceiling.

"It was a real dump," Ray Hagglund declares. "And it was all my problem."

Last winter WPI officials were looking for someone to oversee the creation of the Interactive Qualifying Project (IQP) Center in Washburn, and someone thought of Hagglund. A 1956 WPI graduate with a fine record as a professor of mechanical engineering, he also had a wealth of on-the-job experience in all phases of construction work. He'd almost singlehandedly finished off the interior of his eye-stopping Deck House in Holden. Ray had taught the mysteries of do-it-yourself carpentry, plumbing, and wiring during two recent Intersession courses. Already involved in setting up the new IQP program on campus, he was a true believer in the project approach to solving problems; by renovating the Washburn attic he could put most of his ideas into practice. (What better way to build a project center than with a project-group task force?) Hagglund, officials agreed, looked like the right man for the job.

"What about it, Ray?" "Will you do it? We need to know in a hurry. There's a time bind. Some of the bids are already out."

"Just how long can you give me to decide what to do with the place?" he asked.

"Oh, about fifteen minutes," came the reply.

"How about a week?" Hagglund countered.

"You win," they said.

What he had won was time — no prize. The whole attic was a shambles.

"And looking at the plans that I had been given to work with did little to raise my spirits," Hagglund said.

Because of skyrocketing labor costs, the objectionable paint house (which was a building inside the building) had to remain intact. The ceilings were to be sprayed white. New industrial lighting fixtures would be installed. The floor was slated to be decorated a cheery battleship gray.

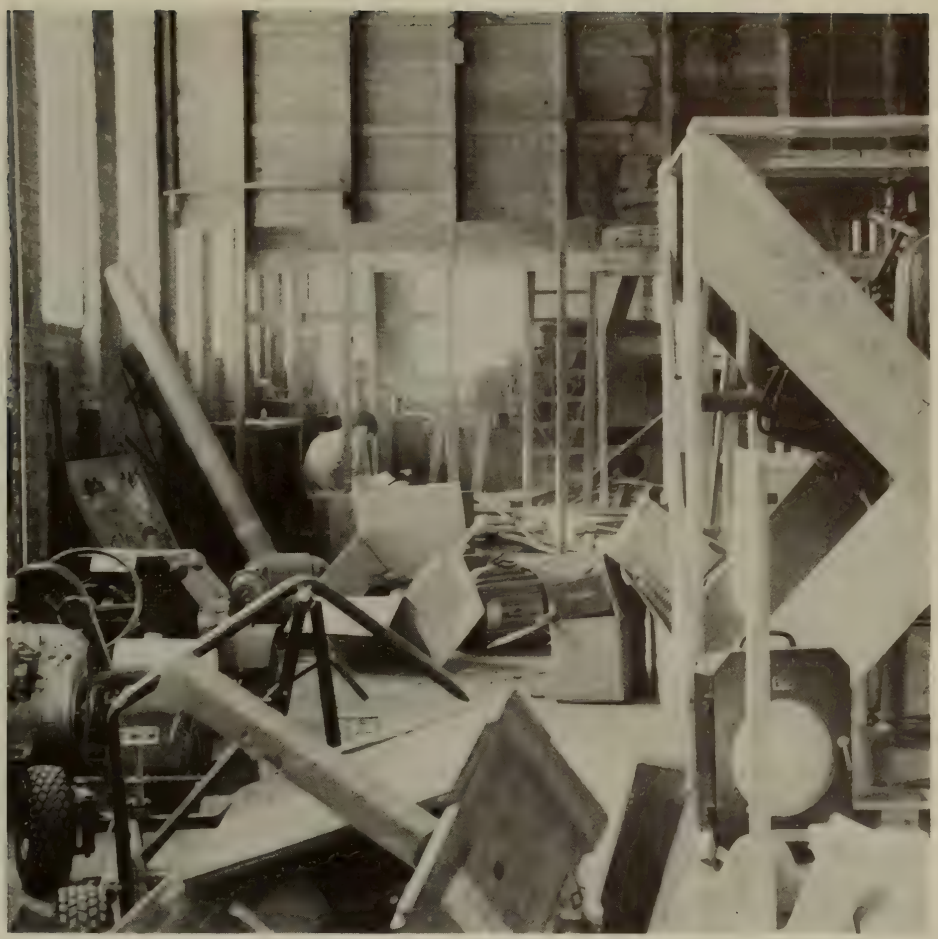
"I knew that I could never study or work in that kind of prison-like atmosphere," Hagglund says. "How could we expect the students to?"

The IQP Committee agreed. After the attic area had been cleaned, new plans would have to be considered. For the time being the committee members decided to go along with what Hagglund wanted, provided he could stay within a limited budget.

What Hagglund wanted first was a wrecking crew, and he got one. In less than half an hour he'd rounded up the promise of volunteer service from EE Prof. James Demetry, '58, and Joseph Mieliniski, '63 (projects administrator), and others including an able crew of students. Inside of two weekends the area was completely gutted and the paint house had become merely a memory.

"A pretty grim one at that," Hagglund comments. "It was the worst demolition project that we had to tackle. In the old days when the paint house was first built, there must have been lots of nails with plenty of people around to pound them. There were several board partitions pounded into 2 x 4's with paper covering each partition. The entire structure was virtually air tight. Finally we got it down, and we managed to salvage some of the boards for future use."

There was a solid floor-to-ceiling partition directly in the middle of the main attic area that caused trouble, too. Demetry managed to cut through it, and then the IQP Committee decided to remove it entirely.



Three views of the awful mess that confronted Ray Hagglund's wrecking crew.

About this time the IQP Center renovations came to a screeching halt. There were rumblings of unrest among the campus trade unions because of the work being done by faculty and students. Some feared that one of the unions might strike. If that happened would the union workers building the Ellsworth and Fuller residences strike in sympathy? But beyond the labor-management question, there were obviously areas in which professional union help was needed. City building codes, for instance, require that licensed electricians and plumbers perform or supervise work in these areas.

With a can-do attitude and the cooperation of the skilled craftsmen in the Buildings and Grounds department, these problems were solved. The Center task force grew to include the help of B&G artisans outside of their regular working hours – and they were paid accordingly.

There was also some concern about insurance coverage for faculty and students who might be injured while working on the project as volunteers. Arrangements were made to pay students and this problem also disappeared.

With these "details" behind him, Hagglund presented a proposal to the President's Committee outlining his plans for completing the Center. The committee, impressed, gave him total responsibility and financial authority. Serving as his own general contractor, Hagglund underbid other competing contractors. By doing their own work, he and his wrecking crew (turned builders) saved enough money to include wall-to-wall carpeting, a water bubbler, and better lighting, none of which had been included in the outside bids. Remarkably, he did this while employing campus union workers on a time-and-a-half basis.

He knew how to cut corners and come out ahead. The first decision before him concerned the lighting. By following do-it-yourself methods he was able to buy and install $120 light fixtures (outside contractor's bid, installed) for only $42 each.

When it came to constructing cubicles where students could meet and work in small (2-5 person) groups, toilet room partitioning at $1 a linear foot was used. "Why not," Hagglund laughs. "It's the same stuff they've used in St. Joseph's Abbey. Repainted it looks great. Besides, the other contractors were bidding anywhere from $12 to $20 a linear foot for cubicle partitioning." In the end he bought more than he needed and resold the excess. The money he saved by using the unusual but serviceable partitioning paid for the carpeting.

The original plans had no provision for a faculty office area in the Center, but Ray felt one was needed. He found enough left-over money to put in an office complex in which five or six professors can work at the same time in relative privacy.

"We bought used walls through a lumber company where I used to wash floors as a student," Hagglund explains. "I collected my WPI carpenter crew and we dismantled the second-hand partitions (glass-topped, steel-based) and brought them back here for $6 a foot. (Contractor's price new – $50 a foot!)

They had a difficult time dislodging the partitions, but in spite of that, and in spite of having to negotiate the walls down a steep, winding staircase and a too-small elevator, they finally managed to get them into Washburn. "It was worth every bit of the effort," Hagglund says. "And not just because of the money angle either. We needed those partitions to make

a comfortable faculty section in the Center. Eventually all of the faculty will be connected with Interactive Qualifying Project work and they may want to hold meetings here, right close to where the action is."

He smiles and looks at a high, walled-in area at one side of the large room. "There's very little action going on in there, though," he says. "That's no-man's land. The paint house was there once. Now it's just a storage area that we run in and out of. The nuclear reactor is directly beneath it and when it's operating it sends up a cone of radiation. Something like the beam of a flashlight. There's only about as much radiation loose in there as a person might be subjected to through an airplane window on a flight between Boston and Los Angeles. But for safety's sake and because it's man-made radiation, we have to wall it up. The sun, well, we can't turn that off."

Fortunately, it was relatively easy to turn on a money tap to help finance the renovations at the Center, mostly from one major source. In 1970 the Sloan Foundation had awarded the college $200,000 to get the Environmental Systems Study Program off the ground. One section of the grant allotted $15,000 to refurbishing office space, so, with that and other money from WPI, the renovations went ahead. Sloan grants also covered the cost of typewriters, closed-circuit TV, and a computer terminal.

Hagglund looks around the facility that he and his wrecking crew had helped to metamorphose from a dingy gray cocoon into a modestly colored butterfly.

The bright yellow, white, and light gray outer walls contrast strikingly with the walnut and lauan paneling of the interior walls. Handsome orange tweed carpets the floor. The sloping, beamed ceiling is painted a chocolate brown. Many of the students' private work cubicles are lined up directly in front of a large bank of windows. In the middle of the room more work tables are situated directly under rows of modern ceiling lights. Drawing tables are scattered throughout. A large conference room occupies one corner of the Center. The whole area is spacious, well coordinated, and a delight to the eye. Annette de Rhoda (coauthor of "Alpha and Omega," *WPI Journal,* August 1973), a professional interior decorator, picked the colors and did all the decorating, donating her services to WPI.

Both Hagglund and Bernard J. Dodge, '70 (associate projects administrator) are enthusiastic about what the IQP Center can mean to the student just becoming involved with the world of the Interactive Qualifying Project.

"At first he may feel overwhelmed when he looks at the scores of projects outlined in the Projects listing," Dodge says. "But by coming up here and checking the Center bulletin board he'll soon find others, students and professors alike, who share his interests. Before he knows it, he'll have zeroed in on a project that really interests him."

He grins and adds, "You might say the IQP Center is a partner in a three-sided marriage, along with the faculty advisor and the student, with each partner helping the others to live up to their best potential."

"Actually," Hagglund breaks in, "the Center is a noisy extension of the library. Study and research can be carried on here side by side. We're open from 8:30 A.M. to 11 P.M. and we have students man the area during the week and on weekends. We're almost always open for business."

Introduction to Projects, a course taught by Demetry and Hagglund, also helps the student over the hurdles of the project approach by conditioning him to think broadly and analytically. One of the problems that has turned up in this course is: "You've got guests coming to a fancy dinner at your house. You discover, to your dismay, that a squirrel has managed to get into your chimney and is scampering around somewhere above the closed damper, making a terrible racket. Your resources are $10 and you have one hour before

Far left: One end of the attic after most of the debris and junk had been cleared out. With the tearing down complete, the creation of the new IQP facility could begin.

Left and right: In the new center, project work is well underway with students and faculty in planning and rap sessions.

Below: A formal presentation of a project proposal to a group of interested students and faculty in the IQP Conference Room. These presentations are made after preliminary planning work is complete, and they are expected to be done professionally using all relevant audio-visual and demonstration aids. Often these same presentations will be repeated to enlist the aid of outside sponsors.

company arrives. What would you do?" Another of the endless variations is: "A woman has an antique glass bottle worth $700 into which her daughter puts a pet bunny. After several weeks the bunny is too fat to get out of the bottle, and very nearly too fat to remain in it. Mother and daughter are distraught — for different reasons. What should be done?"

Of course these problems aren't very serious, but they do act as mind-training exercises and force the student to see how technological problems can exist in a broader human context. Now he can move on to more serious problems of the sort an engineer is more likely to encounter.

Right now there are a number of problem-solving projects underway at the Center. Two prime examples are a cable TV study, advised by EE Prof. James Matthews, and Dial-A-Bus with Jim Demetry.

Prof. Matthews and his students are putting together a study for the town manager of Holden, Mass. The student project group is weighing the pros and cons of each potential cable TV system from every angle, all the way from environmental to monetary, in the event that commercial cable TV companies approach the town. Although the study is presently hypothetical, the students hope to provide the town manager with enough information so that he will be able to make the wisest possible decision.

Jim Demetry and his four students with their Dial-A-Bus project are looking into the problem of public transportation, particularly in the area of busing. Their thesis is that both bus companies and the public might be better served if smaller, 15-passenger taxi-buses were used as feeder vehicles to buses on the regular lines. In suburban towns, particularly, the regular bus often stops only on the main street. If taxi-buses were made available in the residential areas, perhaps the public might patronize the main bus line more often. In cities the taxi-buses could cover certain routes on an irregular basis. A person could phone for transportation and within fifteen minutes it could be at his door, and he would then join fellow passengers heading in the same general direction.

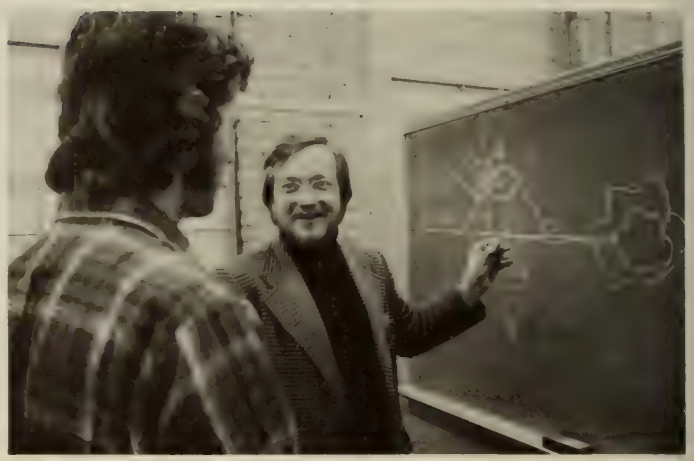
"The students quickly found that what had originally looked like a simple idea, was really very complex," Demetry says. "There were technical aspects, communications difficulties, and logistics of collecting fares to be considered. Also, there was the thorniest question of all — how would the public react to a taxi-bus proposal?"

The main function of the IQP Center is to bring people like Jim Matthews and Jim Demetry together with students pursuing similar goals. "In these particular cases, it was easy," according to Ray Hagglund. "It doesn't always turn out to be." The concept of an Interactive Qualifying Project is difficult for some professors to grasp at first. "It goes against the grain of an engineer," Hagglund observes. "How does a physics professor go about advising students on how to handle technology-related social problems? He has a physics book to guide him in class. But there is no such thing as an IQP textbook. There is no such thing as a people meter either. He's completely on his own."

At present, another slowing factor in the program is that too many professors and students are working on a one-to-one basis on projects. "They have to learn to do their projects in groups," says Hagglund. "It's the only way out. There simply aren't enough faculty to go around." He laughs. "But they'll get the hang of everything sooner or later. Once they try advising project groups, they may discover that they like it. Involvement is the key. . . involvement and commitment."

Below: Economics professor Robert Bjorklund discusses with a student some of the points he ought to consider in his project proposal.

Right: Prof. Ray Hagglund discussing the possibilities of a project dealing with energy measurement.



Ray Hagglund knows what he is talking about. He has had long experience in helping students through project work. In the summer of 1972, for example, there was the matter of the gyroscope packages. A company in Uxbridge, Mass., designed a package supposed to protect an eight-pound gyroscope in a 30-inch fall. The company hired Hagglund as a consultant to see if the design was feasible. Hagglund, like any other consultant-professor, made his own calculations. But then he did something else: the following fall he put the entire project into the hands of college freshmen who had yet to open an engineering textbook!

"I wanted to see if the students, working in small groups, could formulate some kind of approach to the problem," Hagglund explains. "I wanted them to figure out exactly what the company was looking for, and I also wanted to find out if they knew how to go about gathering the information necessary to solve the problem."

Seven weeks later the freshmen came up with their report. They decided that the cushioning legs in the package would *not* be adequate to protect the gyroscope from a force of 12 G's if the package fell on its side from a height of 30 inches, the specifications that the gyroscope manufacturer had listed. They suggested that, by enlarging the container's legs and putting them in different positions, the specifications could be met. One of the failures of the earlier design had been that the too-short legs did not reach the corners of the gyroscope's fiberglass casing, so when dropped there was no braking action to protect the instrument.

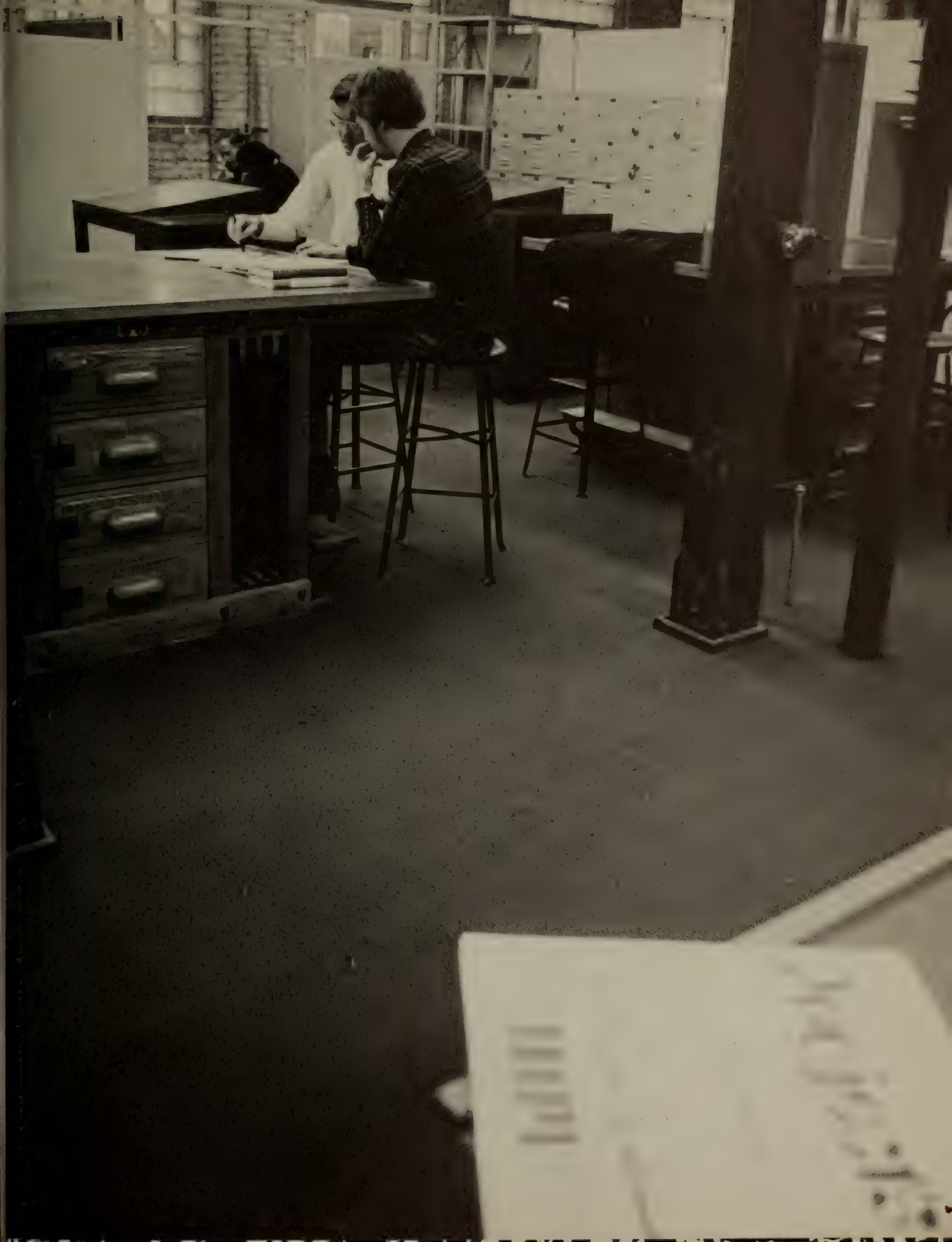
But it wasn't only the freshmen who had a go at the gyroscope package. As an experiment, Hagglund paid a graduate student, a senior, and a junior to solve the same problem as a competency exam inside a two-day limit. The result? The graduate student did well, the senior passed, and the junior failed.

This problem was a forerunner of the kind of technical projects required in the WPI Plan. Students must complete two projects before graduation, one in their major field and another, the IQP, which should relate technology to social problems.

"A good example of an IQP already completed," Hagglund says, "was the work recently done by eleven WPI students in the Worcester Juvenile Court. This group studied the flow of information in the court: what kind of information is required, and how it is gotten and used. Computers were used to speed up the process. The main object of this project was to discover how a machine-based information system would affect people."

Hagglund's involvement with the IQP Center during the past year has affected a number of people, not the least of whom are his family. "My wife and daughters certainly didn't need to have me become a general contractor, in addition to being a professor, to get the IQP program and Center going, but they understood," he says. "Somebody had to do it. I believe in the Plan. I wanted this Center to be worthy of the exciting kinds of research projects that are starting to take root here."

Now that the IQP Center has been completed, the IQP program itself moves forward. In the opinion of many observers of higher education, the interactive qualifying project is the single most distinctive feature of the WPI Plan, and on the IQP's success or failure rests the success or failure of WPI's whole educational program in the next decade. That, in a word, is commitment, but it reflects the commitment of most faculty and students to make the WPI Plan work. ■



Message from the Middle East

WPI's most peripatetic prof probably is chemical engineering professor Alvin H. Weiss. Last year he traveled to the U.S.S.R. as American coordinator of a joint U.S.-Soviet space project. For 1973-74 he is on sabbatical leave, teaching in the Israeli desert at the University of the Negev.

One thing about Al Weiss, he keeps travel diaries. The account of his Russian visit is currently being published in *Chemical and Engineering News.* Here at WPI we have just received a letter from Al telling of his experiences in attempting to enter Israel in the middle of a war. We'd like to share this with *Journal* readers, and we present it here essentially unedited.

To start my sabbatical year from Worcester Polytechnic Institute the Weiss family (Eileen, Alvin and our son, Louis) flew from Boston to Zurich on September 1. We attended the Third Molecular Sieve Conference, then drove through the Swiss Alps and stayed at Bregenz, Austria, on the Bodensee in the Bavarian Alps. Then on to Munich to pick up our Audi Fox and to meet our daughter Linda. Munich, especially the Hofbrauhaus, is great fun. We drove south through the Alps, staying at Innsbruck and then through the Brenner Pass to Verona, and on to Rome, where we spent several days with dear friends (Alex and Vera Logwinuk) who had just moved to Italy. They have rented a beautiful villa in Ostia, not too far from the sea. Then to Sorrento and Capri (in the rain-Feh!) and by ship from Brindisi, Italy, to Patras, Greece. Louis flew to Israel October 1, and the rest of us, after a few days south of Athens on the beach, took the Hellenic Mediterranean Lines Cruise Ship "Appollonia" from Piraeus, sailing through the Greek Dodecanese Islands. A nice day was spent on the most beautiful island, Rhodes, and then Saturday morning, October 6, the ship stopped at Limassol, Cyprus, on its way to Haifa.

And that is when the war started!

The captain of the ship was not permitted by his Company to proceed to Haifa, 100 miles away, and instead sailed to Famagusta, Cyprus, on Sunday, October 7, the day we had planned to arrive in Israel. The tension on the ship was fierce, the Israelis aboard organized the passengers, and almost everyone (except round-trip tourist groups) voted not to accept their passports and disembark. At night, we were able to see explosion flashes in Syria right from the ship.

The ship stayed at the dock, with passengers and crew as tense as imaginable. Consuls from the embassies and newsmen were constantly present. Finally, on October 9, the Port of Haifa was officially closed, and the ship had a legal excuse to terminate the voyage at Famagusta.

So we, and all others destined for Haifa, disembarked. The young people camped near the walled Turkish quarter, those without cars went to Nicosia to be near the airport, and we

rented an apartment on the beach in Famagusta. It is quite a beautiful place, much like a micro-Miami Beach with a Greco-Turkish flavor.

On the morning of the 13th, Eileen learned that a tramp steamer was leaving for Haifa in an hour, so we filled our car with luggage, practically cleaned out a Cyprus Super Market since the BBC was (erroneously) claiming there were great food shortages in Israel, and drove right to shipside and watched the car be hoisted aboard. Then, El Al arranged a special flight in the wee hours the following night. We left Cyprus with only normal searches, and the jet, filled with very happy and relieved people, with all lights on and "Fiddler on the Roof" playing, made the half-hour flight to Lod Airport, Tel Aviv, at 3:00 a.m. on October 15.

As a warm gesture of Israeli hospitality, we were met at the airport by Clive Burton of the University of the Negev, who drove us to the Desert Inn in Beer Sheva (a Las Vegas without crap tables). Convoys of troops were everywhere, and it was inspiring to see elderly men and women operating volunteer free coffee and food stands along the highways for them. The soldiers were incredibly young, exhausted on their way from the Golan Heights to the Sinai.

Wartime Israel was an interesting situation. Daily commerce and civilian driving were in no way hampered. Food, gasoline, and everything except tourists were plentiful. The really careless blackout at night was the only apparent concession to the emergency to which every last man and woman in the country was committed. Trains ran on normal schedules, and we went to Haifa the day after our arrival to retrieve our trunks and car at the port. We also attended the Israel Philharmonic Orchestra concert that night with Zubin Mehta conducting and featuring the pianist Jean-Bernard Pommier. Proceeds of the concert went to the war effort.

Our apartment in Beer Sheva is situated on one of the two main supply routes to the Sinai, and the troop activity and convoys during the nights were impressive. We have an air-raid shelter in the building, and the sirens would sound whenever a UFO crossed the Suez. By the date we arrived, nobody bothered to go to the shelter except us, once, since the Israelis figured that it was impossible for a plane to penetrate as far as Beer Sheva.

The Israelis are very efficient. Monuments serve as lookout towers, for example, and the soldiers enjoyed having us come up and visit with them. Troops move around the country to their posts by hitch-hiking, and we, as everyone else, always made sure we had a car full of soldiers, usually with their machine guns. (Incidentally, theirs is the only one in the world with a bottle opener built into the handle – that's foresight.)

We drove to the Dead Sea and along the Jordanian border on the 20th. Except for the empty hotels and hitch-hiking soldiers one would not imagine that he was looking across the border of two warring countries. The Dead Sea Potash Plant was in full operation on the border. Northern Negev desert and Dead Sea area are very reminiscent of the barren, rugged mountainous desert area around Hoover Dam in Nevada and Arizona, and not at all sand dunes like the Sahara. Camels, donkeys, and Bedouins are very colorful inhabitants of this area.

Since practically all the students and professors were in the army, the Technion in Haifa was totally closed down. The University of the Negev remained open to organize volunteer services, but there were no classes. Linda went out picking cucumbers as her contribution to the war effort.

Beer Sheva has an Absorption Center for new immigrants, who are constantly coming in. They are mainly Russian Jews, and literally thousands are emigrating here. Many are very cultured and we heard an excellent chamber music concert from them one evening.

I am writing this on the 22nd of October, the day Kissinger visited Israel. Hopefully, the cease-fire will hold and peace will come to this dynamic, determined little country. Shalom from all of us.

Al Weiss

Your Class and Others

The data on which these class notes are based had all been received by the Alumni Association before October 1, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI Journal.

1910

CARLYLE A. ATHERTON has moved from Kimball Towers in Springfield, Mass. to 533 Konsigswinter, Am Domstein 9, c/o Joseph G. Bradley, Jr., West Germany. . . . MILLARD F. CLEMENT has returned to Massachusetts (Granby) after 49 years as a New Yorker. He writes that it takes more than one generation to make a New Yorker out of a New England Yankee who was "brought up in the White Mountains of New Hampshire."

1921

GENERAL WILLIAM S. LAWTON (ret.) recently received Lambda Chi Alpha's Order of Achievement Award in recognition of his 38 years of distinguished military service. During his career he was Chief of Staff of Army Field Forces in Virginia, Chief of Staff of the Central Pacific Area, and Chief of Staff for the East Command. He served as Commanding General of the Korean Communication Zone and Comptroller of the Army in Washington. Among his decorations are the Distinguished Service Medal, Legion of Merit, and the Bronze Star. Currently he is vice-chairman of the Board of the Government Savings and Loan Corporation.

1926

Professor Emeritus KENNETH G. MERRIAM is listed in the 1972-73 edition of *Who's Who*. For many years he taught in the mechanical engineering department at WPI, retiring in 1969.

1927

ARTHUR C. MANNING, owner of Arthur Manning Associates, Upper Montclair, N.J. has been elected secretary of the Society of Professional Management Consultants, Inc., New York City. The Society is the oldest organization serving the individual professional management consultant and has been accrediting members since 1960. . . . PURDY F. MEIGS recently retired to Roswell, N.M. where he was interested to find that a Goddard Tower and rocket are featured at the Roswell Museum. Dr. Robert H. Goddard, '08, "father of the modern rocket," did basic research at Roswell during the 1930's and 1940's.

1930

Dr. HARRY A. SORENSEN, professor emeritus of mechanical engineering at Washington State University, is currently listed in *Who's Who*. He is the author of the textbook, *Gas Turbines*.

1934

GEORGE KALISTA writes that he recently attended the unveiling of the portrait of former WPI president RALPH EARLE, '95, at the Officer's Club at Naval Ammunition Depot Earle, Colts Neck, N.J. Earle was president of WPI from 1925 until his death in 1939. Previously he had served in the Navy with distinction in the World War I era and later as Chief of the Bureau of Ordnance. Kalista says, "When I first came aboard and saw (Admiral Earle's) picture, I was deeply moved. It took me back to the days at Tech, when as a student, I knew him." Kalista is connected with the laboratory at the station.

1936

JOSEPH R. HASTINGS, Jr. is vice president and director of Frank B. Hall & Co., Inc., New York City.

1937

LAURENCE F. GRANGER has retired from the American Iron & Steel Institute, New York City. He is presently located in South Yarmouth, Mass.

1938

ROBERT A. EVANS has been appointed assistant vice president of mechanical and nuclear engineering at Northeast Utilities, Berlin, Conn. In 1955 he joined the Hartford Electric Light Co., now a Northeast subsidiary. He transferred to Northeast in 1967 as chief mechanical engineer and was named manager of mechanical and nuclear engineering in 1969. . . . ROBERT W. O'BRIEN is purchasing manager at Sealtest Foods, Philadelphia, Pa. . . . ROBERT C. STICKLE is a group leader at Dow Chemical Co., Midland, Mich.

1941

Dr. JOHN B. BELL, Jr. has been named director, project development, of Cyanamid International's Latin American Region. He has been manager of the Market Research Department in the Commercial Development Division of American Cyanamid Company. Prior to entering commercial development he was a research chemist with Jefferson Chemical Company, a joint venture of Cyanamid and Texico which he joined in 1946. . . . WILLIAM R. HIGGINS is senior staff engineer at Schwitzer, Division of Wallace-Murray, Indianapolis, Ind. . . . HILLIARD W. PAIGE, president of General Dynamics Corp., has been named chairman and chief executive of the CML Satellite Corporation of Washington, D.C. Prior to joining General Dynamics two years ago, he was with General Electric for 29 years, where he served as senior vice president and aerospace and computer group executive. His new company, CML, was formed two years ago to develop a domestic satellite system to serve business, computer and television markets. It is owned equally by the Communication Satellite Corporation, the MCI Communications Corp., and the Lockheed Missile and Space Company. The

Portrait of Admiral Ralph Earle, sixth president of WPI, which now hangs in the Officers Club at Naval Ammunition Depot Earle. The picture was sent in by George Kalista, '34.

Federal Communications Commission approved CML's application to develop the satellite in 1972.

1942

WARREN B. ZEPP is now teaching mechanical drawing at Nashoba Regional High School, Bolton, Mass.

1943

ARNOLD R. JONES was recently appointed divisional vice president and general manager of Engineering and Construction Services, a new position at Norton Company, Worcester. Previously he was director of Engineering and Construction Services. In his new post he is responsible for E & C Services support of Norton's Worcester and worldwide facilities. He also supervises the negotiations and sale of Norton abrasive technology to foreign countries, including two agreements with the Soviet Union and Rumania. . . . JACKSON L. DURKEE writes that he extends a challenge to the rest of the class to a son-in-law contest. As of August 25, with the marriage of his youngest daughter, he boasts three—designated S1, S2, and S3. "Any contenders?" he asks. As for professional activities, Jack continues as chief bridge engineer of Bethlehem Steel's fabricated steel construction division. He was recently elected a Fellow of the Institution of Civil Engineers, Great Britain.

1944

RICHARD K. MERRELL is currently a sales engineer at Spectrumite Corp., Worcester. . . . JOHN R. McCLAIN, Jr. was one of the co-authors of the article, "Manufacturing Development For the Miniature Wire Spring Relay", which appeared in the July issue of Western Electric's *The Engineer.* He is a planning engineer and a member of miniature wire spring relay manufacturing engineering at the Columbus Works. His assignments have included manufacturing development engineering for Electronic Switching Systems and products engineering for the miniature wire spring relay. Mr. McClain is a Registered Professional Engineer in the State of Ohio. He joined Western Electric in 1959.

1945

WILLIAM C. HOWARD has been named corporate vice president of the new Abrasives Marketing Group at Norton Company, Worcester. Earlier he was divisional vice president, sales, Grinding Wheel Division. The new organization will provide centralized marketing services to the company's Grinding Wheel and Coated Abrasive Divisions. Howard joined Norton in 1948 as a sales trainee. He is a member of Sales and Marketing Executive International and Machinery and Allied Products Institute Marketing Council. . . . HUGO L. NORIGE is now with Millers Falls Co., Manchester, Conn. . . . SIDNEY B. WETHERHEAD has been appointed to a new corporate post, international director of engineering and construction services, at Norton Co. in Worcester. He had been area director for Europe, Africa, and the Middle East, Abrasive Operations. He joined Norton in 1947.

1946

JOSEPH J. CONROY, Jr. works for Seamless Rubber Co., New Haven, Conn. . . . FOSTER JACOBS is now director of planning and plant at Southeastern Massachusetts University, North Dartmouth, Mass. Previously he was director, physical plant, at Princeton University. Last May the Jacobses enjoyed a trip to Switzerland and France. . . . Currently DONALD J. GIRARD is general manager of Trane Western Hemisphere, Inc. and vice president of Caribbean Centrifugal Services, Inc., in San Juan, Puerto Rico. . . . FREDERICK J. KULL serves as administrator-grade crossing program in the Safety and Freight Claim Prevention Department of the Southern Railway Co., Atlanta, Ga. . . . EDMUND S. OSHETSKY is resident manager at Lincoln Pulp & Paper Co., Inc., Lincoln, Me.

1948

ROBERT H. ADAMS serves as vice president-electrical products group, at Gould, Inc., Chicago, Ill. . . . EDMUND J. EAGER is a proposal engineer for Westinghouse in Greentree, Pa.

1949

WILLIAM A. JULIAN is now a self-employed land developer and is located in McLean, Va. . . . PAAVO JUNNO works as a plant manager for J. G. Tilp, Inc., Union, N.J.

1950

STANLEY FRIEDMAN has been appointed as chairman of the Corporate Liaison Committee of the United Way of the Tonawandas (N.Y.), Inc. . . . FRANCIS W. NORTON is a general engineer with Monsanto in South Windsor, Conn.

1951

WILLIAM J. CUNNEEN is now assistant to the chief control system engineer at Stone & Webster, Boston. . . . RODERICK J. HORTON holds the post of reliability manager at Industria Electrica De Mexico, S.A., in Tlalnepantla, Mexico. . . . DEWEY R. LUND works as assistant product manager at Pressure Products (Division of Duriron Co., Inc.), Hatboro, Pa. . . . KENNETH E. MAYO and his company, Tuned Sphere International, Inc., Nashua, N.H. are developing a sphere which will keep oil supertankers 20 miles offshore, cut unloading time and import premiums, and also satisfy the environmentalists. The use of such floating terminals could reduce the cost of oil imported to this country by 15 cents a barrel according to an article which appeared in a recent issue of *New Englander Yankee, Inc.*

1953

EMIL G. LARSON, who recently retired from the Air Force with the rank of lieutenant colonel, has been appointed Public Buildings Commissioner in Newton, Mass. . . . Dr. HERBERT SLOTNICK has been promoted to the rank of full professor at Central Connecticut State College, New Britain, Conn. He had been a member of the Chemistry Department since 1967 and has received numerous research grants. . . . MICHAEL S. ZUCKER is the newly-elected president of the Wappingers (N.Y.) Board of Education. His district is one of the largest central districts in the state and has a budget in excess of $20 million.

1954

GREGORY P. ARVANTELY is now a staff engineer at IBM Corp., Manassas, Va. . . . MARVIN V. McCOY serves as regional sales manager for ITT-Blackburn, Merrimack, N.H. . . . DAVID F. GILBERT, works manager at E.I. DuPont deNemours and Company, Montague, has been named chairman of the Challenge Division for the 1974 United Way Campaign in Whitehall, Mich. . . . GEORGE H. KAY, Jr. is presently quality assurance manager for D. G. O'Brien, Inc., Framingham, Mass.

1956

ALLAN C. HAMILTON, Jr. is department chief-process engineering at Western Electric Co., Inc., Richmond, Va. . . . HALBERT E. PIERCE, department superintendent of fine chemicals at Hooker Chemical Corp., has joined the United Way 1973 Campaign as a unit chairman in Niagara Falls, N.Y. Previously he had served in United campaigns as a large firms captain, as Hooker's United Way Campaign chairman, and as Niagara plant chairman. Mr. Pierce is also treasurer of the Parents Association of Hearing Handicapped Children of Western New York. . . . ROY A. SEABERG has been promoted to associate director of admissions at WPI.

1957

WARNER I. CLIFFORD holds the position of superintendent of construction at Stone & Webster, Boston. . . . JOHN D. MINOTT, environmental engineer at Continental Oil Company's vinyl chloride monomer plant at Westlake, La., was the author of the article, "A Water Treating System For a VCM Plant" in the August issue of *Chemical Engineering Progress* (CEP). . . . Currently PAUL M. MITCHELL is product manager at Dresser Industries, Inc., Brussels, Belgium

1958

RAYMOND A. JOHNSON, vice president and sales manager of Johnson-Claflin Corp., Marlboro, Mass. was recently named "Celebrity of the Week" in Marlboro. He became the third generation member of the family to become associated with Johnson-Claflin in 1961 after he had served at the Missile Testing Headquarters of the Redstone Arsenal in Huntsville, Ala. for two years. Active with the Young Republicans, he was also named through the Jaycees as one of the "Outstanding Young Men of America" in 1968. In 1969 he was presented a plaque by the editorial board of Community Leaders of America and was listed in "Who's Who in American Politics." . . . SHERMAN K. POULTNEY is currently a research associate professor at Old Dominion University, Norfolk, Va. In his new position he will work closely with a NASA Langley group on a theoretical/experimental program to develop active optical sensors for remote measurements of aerosol and gaseous pollutants in the lower atmosphere. . . . WILLIAM A. RABINOVITCH recently opened his new studio-art gallery, Rabinovitch & Guerra Gallery, at 63 Crosby St., New York City.

1959

BURNHAM H. BAKER is director of corporate planning at Addressograph-Multigraph in Cleveland, Ohio. . . . PETER K. BERTSCH serves as a senior development engineer for Cottrell Co. (Division of Harris-Intertype Corp.), Westerly, R.I. . . . Presently THOMAS F. HUMPHREY is director of Bureaus of Transportation Planning and Development for the Commonwealth of Massachusetts, Department of Public Works, Boston. . . . ROGER W. KUENZEL works as a project representative (sewer improvements) at Smith, Miller & Associates, Kingston, Pa. . . . WILLIAM U. PURSELL, Jr. is materials manager for Reed Tool Co., Houston, Texas. . . . GORDON H. SIGMAN now serves as chief of the Artillery, Infantry and Combat Vehicle Fire Control Division at Frankford Arsenal, Philadelphia, Pa. . . . PAUL M. STONE works as a self-employed civil engineer in Long Beach, Calif. . . . HOWARD H. STREET holds the position of product superintendent at E.I. duPont deNemours & Co., Orange, Texas.

MORGAN
CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1960

GEORGE S. BEEBE has been named manager, plant engineering and facilities, at Compugraphic Corporation, Wilmington, Mass. Formerly he was facilities planning manager for Digital Equipment Corporation, Maynard. . . . ANDREW R. MILLS is program development manager at Hewlett Packard, Sunnyvale, California.

1961

Married: JOSEPH F. GLIWSKI to Miss Gail D. Rozman in Chicopee, Massachusetts on August 11, 1973. Mrs. Gliwski is a graduate of the University of Massachusetts. Her husband is with Hearthstone Insurance Co. of Massachusetts in Boston.

Dr. JAY A. FOX has been cited at the U.S. Army Mobility Equipment and Development Center, Fort Belvoir, Va. for co-authoring the paper "Laser Induced Shock Effects in Plexiglas and 60061-T6 Aluminum" which appeared in the June issue of *Applied Physics Letters.* . . . LEO J. ROBICHAUD is superintendent for Cianbro Corp., Presque Isle, Maine.

1962

Dr. CHARLES F. BELANGER, Jr. is a pediatrician in Saco, Maine. . . . JOHN E. MATSON serves as branch sales manager at Carrier Air Conditioning Co., East Syracuse, N.Y. . . . Prof. LEE C. SIROIS is the new director of student affairs at American International College, Springfield, Mass. He has taught psychology at AIC since 1965 and has published articles on the effects of magnesium pemoline, a memory stimulant. . . . Dr. JOSEPH T. SWARTZBAUGH is an associate research physicist at the University of Dayton in Ohio.

1963

Married: RICHARD T. DANN and Miss Charlene T. Lanza on September 22, 1973 in West Hartford, Connecticut. Mrs. Dann was graduated from the Surgical Technician Program at Hartford Hospital. Mr. Dann is an assistant editor of *Machine Design Magazine.*

PETER BARSS, who has been a member of the faculty at Nashoba Regional High School, Bolton, Mass. for the past six years, is taking a year's leave of absence so that he may write a book. He and his family are now located in Nova Scotia where he is gathering material for his book which will be a photographic essay of the fishermen in the area.

1964

Prof. BRADLEY T. GALE, who is taking a 15-month sabbatical from the University of Massachusetts, is currently at Marketing Sciences Institute, Cambridge, Mass. . . . BARRY J. KADETS is now with the Analytic Sciences Corp., Reading, Mass. . . . DAVID D. McCAFFREY holds the post of technical sales representative at Union Carbide Corp., Chicago. . . . WILLIAM J. MUSELER recently joined Long Island Lighting Company, Hicksville, N.Y., where he is assistant project engineer in the Nuclear Projects Department. He is primarily involved with the Shoreham Nuclear Power Station. . . . THOMAS B. NEWMAN, Jr. works as a salesman for Teradyne, Inc., Boston. . . . Capt. WALDEMAR C. ZISCH has received his second award of the U.S. Air Force Commendation Medal at Pease AFB, N.H. He was cited for his meritorious service as a missile launch control officer at Vandenberg AFB, Calif. Presently he is an electrical engineering training officer with a unit of the Strategic Air Command at Pease.

1965

Married: Capt. ERIC P. WARMAN, USAF, and Miss Gisela G. Carlstrom on September 8, 1973 in Worcester. The bride was graduated from the University of Connecticut and is a social worker for the Massachusetts Department of Public Welfare. Her husband is stationed at Ft. Walton Beach, Florida.

RAYMOND J. AGNELLO is general manager at Humphreys Exterminating Co., Inc., Fallston, Md. . . . PHILIP BAKER, a senior systems engineer at Polaroid for five years, holds several patents through Polaroid. In September *The Times* of Peabody, Mass. announced that he had been selected as a judge for its "Phlugerhaggen Contest." . . . CHARLES W. CLARK is service engineer at Hewlett Packard and is located in Loveland, Colorado. . . . CHARLES S. FRARY III serves as commercial supervisor-forecasting staff, at New England Telephone, Boston. . . . RONALD G. FRIEND has joined the Masoneilan Regulator Company of Norwood, Mass. where he is chief engineer. Formerly he was associated with the Jamesbury Corporation, Worcester. . . . WALTER E. HENRY, Jr. works as plant engineering manager at Hewlett-Packard Co., Waltham, Mass. . . . MICHAEL G. KULLAS is assistant manager at Windsor Gardens Drug, Denver, Colorado. . . . ROBERT K. WAITE, Jr. is now manager of Peebles Jewel Shop in Berkshire Plaza, North Adams, Mass. His parents are owners and operators of the business. He was with American Machine and Foundry Corp.

1966

ANDREW J. FISH, Jr. has received his MSEE from the University of Iowa. . . . GRANT P. MAIER writes that he is still a senior analytical engineer with Pratt & Whitney, East Hartford, Conn. His wife, Beverly, teaches first grade in Glastonbury where the Maiers have purchased a new colonial home. . . . RAYMOND G. O'CONNELL, Jr. is manufacturing engineer at Hewlett-Packard, Waltham, Mass. . . . Currently EDWARD PERO serves as a senior design engineer at Pratt & Whitney Aircraft, East Hartford, Conn. . . . ROBERT E. SHAW is a manufacturing engineer at Cryogenic Technology, Inc., Waltham Mass. . . . DAVID H. STONE is a plastics processing engineer at Rohm & Haas Plastics Engineering Lab., Bristol, Pa. . . . ROBERT D. WILSON works as a materials engineer in the area of casting development technology at Pratt & Whitney Aircraft, East Hartford, Conn.

1967

ALLAN T. BUROS, Jr. is a reliability engineer for Sanders Associates, South Nashua, N.H. . . . Dr. WILLIAM E. COBB, who received his MD from the University of Rochester, is now on active duty with the U.S. Navy on the USS Francis Marion out of Norfolk, Va. . . . JOHN R. DAUGHERTY has been employed as a consultant by Barton & Associates, Santa Monica, Calif. . . . JOHN F. GARBARINO was recently appointed office manager of the Olde Mistick Village Branch of the Union Trust Company in the Mystic-Stonington area of Connecticut. He has been with Union Trust since 1971 and was assistant manager of the bank's Old Saybrook Office prior to his latest promotion. . . .

RICHARD M. GUTKOWSKI has assumed an assistant professorship in the Department of Civil Engineering at Colorado State University in Fort Collins. . . . GUNNAR J. STALEMARK is a sales engineer at the Foxboro Co., Tonawanda, N.Y. . . . HERMAN A. WOJDYLAK, Jr. serves as a captain in the U.S. Air Force and is presently stationed at Offut AFB, Omaha, Nebraska.

1968

Married: ALBERT J. BOHLIN to Miss Joan E. Honan on September 8, 1973 in Newtown, Connecticut. The bride is a medical secretary. The bridegroom is an executive with the Cape Cod Paper Company, Dennis, Mass. . . . JOSEPH B. KERRISSEY, Jr. to Miss Eleanor M. Bushey on September 9, 1973 in Hingham, Massachusetts. Mrs. Kerrissey graduated from Burdett College and is employed by C.I. Designs in Medford. . . . LOUIS H. STRONG to Miss Rita K. Michel on August 4 in Toledo, Ohio. Mrs. Strong, a realtor, attended the University of Toledo. The groom is a biophysicist and a doctoral candidate at the University of Michigan.

RICHARD L. DUBSKY is at Woodberry Forest School, Woodberry Forest, Va. . . . ERIC K. DURLING works as assistant engineer for the Town of Acton, Mass. . . . ROBERT B. GILLIES, associate professor of electronics at Quinsigamond Community College, Worcester, is exchanging classes with a professor at Manchester Polytechnic in England this year. Prof. Gillies was one of 75 Americans chosen out of 1,000 applicants for the exchange professorships. . . . Presently GEOFFREY L. HARTUNG is a corporate engineer with Uniroyal, Inc., Middlebury, Conn. . . . BRUCE G. LOVELACE has been employed as a research engineer at Specialty Aromatics, Dow Chemical Co., Midland, Mich. . . . JOHN MacDOUGALL works at General Electric Company's Knolls Atomic Power Labs in Schenectady, N.Y. . . . ALAN D. POTOFF is with the Dow Chemical Co., Midland, Mich. . . . Currently ROBERT C. WIDEN serves as a structural engineer at Stone & Webster, Boston.

1969

Married: ROBERT J. DASHNER to Miss Jane B. Gersmeyer on August 25, 1973 in Havre, Montana. Mrs. Dashner graduated from Montana State University. The groom is a computer systems analyst for the Millipore Corporation, Burlington, Mass. . . . ANDREW T. PERREAULT to Miss Katherine M. Stapleton in Altamont, New York on September 8, 1973. Mr. and Mrs. Perreault are employed by the Knolls Atomic Power Laboratory, where the bride is a program planner and the groom is an engineer. . . . STEVEN L. ZIEVE to Miss Frances M. Wynings in Windsor Locks, Connecticut on September 9, 1973. The bride is a graduate of Wittenberg University. The bridegroom is employed by Stanley Works, New Britain, Connecticut.

GEORGE G. DAVENPORT is a construction supervisor at the United Illuminating Co., New Haven, Conn. . . . MERRILL F. SPROUL serves as a senior heat treat engineer at Corning Glass Works, Corning, N.Y.

1970

Married: FREDERICK A. GOLEC, Jr. to Miss Susan M. Robinson on September 1, 1973 in Tarrytown, New York. The newlyweds are living in Seattle, Wash. where both are pursuing their doctorates at the University of Washington. . . . MICHAEL S. HORNER and Miss Marcia A. Wirsul on August 25, 1973 in Wethersfield, Connecticut. Mrs. Horner is a senior at the University of Connecticut. Her husband is employed by Pratt and Whitney. . . . FRED H. TUTTLE to Miss Barbara J. Tettoni on August 4, 1973 in Mystic, Connecticut. The bride graduated from the University of Massachusetts and Southern Connecticut State College. Mr. Tuttle works for Pfizer, Inc., Groton, Conn.

RICHARD F. ABRAMS is pilot plant supervisor at Artisan Industries, Inc., Waltham, Mass. . . . HENRY R. BLOCK received his MS in nuclear engineering from Pennsylvania State University last August. . . . RASIKLAL V. CHOKSHI is a stress engineer at Babcock & Wilcox Co., Nuclear Power Group, in Lynchburg, Va. . . . PETER J. DENONCOURT has been appointed chairman of the science department and will also teach drafting and electronics at the New Independent High School in New London, Conn. . . . RALPH Di IORIO holds the position of dial equipment supervisor at New England Telephone Co., Boston. . . . CARL E. KRASNOR and his wife, Linda, are currently located on a farm 120 miles west of Toronto, Canada. They have a year-old daughter, Rebecca. . . . LEE C. MALBON is a mathematics teacher at Malden (Mass.) High School. . . . WILLIAM M. ROLYA now works for the Linde Division of Union Carbide Corporation in Tarrytown, N.Y. . . . JUAN F. WEISZ, who received his MS in physics from the University of Kansas this year, is now service representative for IR and NMR spectrometers at Digilab, Cambridge, Mass.

1971

Married: Ens. MICHAEL P. ARMENIA and Miss Joanne Ebbitt last summer in Newport, Rhode Island. The groom is serving aboard the cruiser Little Rock, flag ship of the Sixth Fleet. The Armenias expect to live in Gaeta, Italy. . . . WILLIAM A. MATULEWICZ, Jr. to Miss Patricia Ann Blake on August 11 in Hamden, Connecticut. The bride is a graduate of Western Connecticut State College. . . . CREGG C. McWEENEY and Miss Linda Ann DiLaurenzio on August 4, 1973 in Torrington, Connecticut. Mrs. McWeeney teaches in Waterbury. The bridegroom is co-owner of P & M Industrial Finishing Co., Waterbury, Conn.

PAUL BIENICK, who received his MSEE from WPI in June, has begun the active duty phase of the ROTC program. . . . PAUL J. CLEARY is a visiting lecturer in the English department at WPI. . . . GREGORY S. DICKSON is a production development engineer for Dow (Chemical) ABC Production, Midland, Mich. . . . WILLIAM B. ERICSON works at Data General Corp., Southboro, Mass. . . . PAUL J. EXNER received his MS in chemical engineering from the University of Pennsylvania last May and is now with Day & Zimmerman Environmental Engineers in Philadelphia. . . . Dr. JAMES A. KAUFMAN is a research chemist for Eastern Research, Dow Chemical Co. . . . EDWARD C. LOWE III works for General Electric Company and is currently located in San Jose, Calif.

RICHARD P. SAN ANTONIO is now in his sophomore year at Washington University School of Medicine, St. Louis, Missouri. He completed his MS degree at MIT in September of '72. . . . JOHN R. SHOTLIFF serves as associate engineer at Electronic Associates, Inc., West Long Branch, N.J. . . . FREDERICK J. SZUFNAROWSKI is a photogrammetric engineer employed by Col-East, Inc., at Harriman Airport. He obtains surveys by photography and makes maps from aerial photographs. He and his wife, who have just purchased a home in North Adams, Mass., have a daughter, Savitri, 2 ½ and a son, Stephen, eight months. . . . DAVID A. TRUE is now chief chemical technologist at New England Power Co., Brayton Point Station, Somerset, Mass. . . . MICHAEL P. ZARRILLI is in commercial banking at Manufacturers Hanover Trust Co., New

York City. He received his MBA this year from Wharton School of Finance at the University of Pennsylvania.

ELLEN L. BRUECK (formerly Sister Donald M. Brueck) is now on the mathematics faculty of Wilbraham and Monson Academy and is located in Monson, Mass.

1972

Married: JAMES J. ALTOONIAN to Miss Priscilla M. Piligian on August 18 in Indian Orchard, Massachusetts. Mrs. Altoonian graduated from Bridgewater State College. The groom is working for his MBA at Wharton School of Finance at the University of Pennsylvania. . . . JOHN H. BLAISDELL and Miss Cheryl Ann Coty on August 4, 1973 in Pittsfield, Massachusetts. The bride, a graduate of Anna Maria College, is a mathematics teacher in Pittsfield. The bridegroom is with Tectrol Associates, West Springfield, Mass. . . . KENT D. BORNER to Miss Nancy S. Sparrow in Newington, Connecticut on June 18, 1973. Mrs. Borner is a graduate of Southern Connecticut State College. The groom is employed by Union Carbide Co., Chicago, Ill. . . . JOSEPH G. HARKINS to Miss Kristine A. Grundstrom on September 8 in Worcester. The bride attended St. Vincent Hospital School of Nursing. Her husband is a computer programmer at Norton Company, Worcester.

Married: THOMAS C. HUARD to Miss Susan Dudek on July 22, 1973 in Webster, Massachusetts. Mrs. Huard is an English teacher at Bay Path Vocational Technical School, Charlton. The bridegroom teaches chemistry at Shepherd Hill School, Dudley.... ROBERT J. LEDUC and Miss Diana Rucci on August 25, 1973 in New Canaan, Connecticut. Mrs. Leduc is a graduate of Annhurst College. Her husband is with Westinghouse Nuclear Center, Pittsburgh. . . . JOSEPH M. SZLOSEK and Miss Margaret R. Lombardi on August 25 in Providence, Rhode Island. The bride teaches at Perryville Elementary School, Perryville, Md. Mr. Szlosek works for American Cyanamid in Havre de Grace. . . . PATRICK E. TAMBORRA and Miss Christine M. Alferi on August 18, 1973 in Norwich, Connecticut. Mrs. Tamborra attended Western Connecticut College. Her husband is studying for his master's at WPI. . . . JOHN ZORABEDIAN, Jr. and Miss LESLEY E. SMALL on June 9, 1973 in Spencer, Massachusetts. The bride is currently a staff engineer for New York Telephone Co. The groom is employed by the Steam Turbine Division of General Electric Company in Schenectady, New York.

MARK G. ANDREWS works as production control manager at C & M Wire Products, Wauregan, Conn. . . . MARK DUPUIS won the discus event of the AAU's Eastern Regionals with a throw of 159 feet 10 inches last summer. Earlier, in a pre-meet warm-up at Bangor, Me., he threw for a distance of 168 feet, his best to date. Mark is a member of Proctor and Gamble's management training program in Quincy, Mass. . . . Dr. RAYMOND M. FISH wrote "A Method of Coding Complex Shapes for the Blind by an Auditory Display" which appeared in a recent issue of the *Journal of the Audio Engineering Society.* Dr. Fish, who was with the National Institutes of Health, Bethesda, Md., is now attending medical school at the University of Chicago. . . . Airman SCOTT L. GRAHAM has graduated at Chanute AFB, Ill. from the Air Force aircraft maintenance specialist course conducted by the Air Training Command. He is being assigned to Travis AFB, Calif. for duty with a unit of the Military Airlift Command. . . . ANDREW J. LASKO has been named assistant engineer-test at the Connecticut Light and Power Co., Berlin, Conn. He joined CL & P in 1972 at Mystic as a cadet engineer.

ANDREW G. MAYSHAR is now employed by Aengus Engineering Co., Fayville, Mass. . . . DONALD POLONIS, who recently received his master's degree from the Institute of Administration and Management at Union College, Schenectady, N.Y., has accepted a position as industrial engineer systems specialist with Timex Industries, Millbury, Conn. . . . DAVID RIEDEL has been given a teaching assistantship scholarship in the computer science department at the University of Connecticut where he is a graduate student. . . . RAYMOND P. ROBERGE has received his master's in chemical engineering from the University of Michigan and is now a research engineer at Union Carbide Corp., Tarrytown, N.Y. . . . BRIAN J. SAVILONIS is studying for his doctorate at New York University.

jamesbury

manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves

Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

1973

Married: ROYCE E. BRAINARD to Miss Susan L. Brown on August 11, 1973 in Springfield, Vermont. Mrs. Brainard graduated from Becker. Her husband is employed by Harper Buffing Machines in East Hartford, Conn. . . . WILLIAM C. CARTON and Miss Katherine A. Horne on July 21, 1973 in Everett, Massachusetts. The bride graduated from Northeastern University College of Education and is a computer scheduler for Paul Revere Insurance Co. Mr. Carton works for Teradyne of Boston. . . . DANIEL L. EIDE and Miss Ethel C. Mastin on September 15, 1973 in Ridgewood, New Jersey. Mrs. Eide, a medical secretary, graduated from Colby College, New London, N.H. Her husband is a process engineer at Gordon Chemicals, Inc. in Worcester. . . . PAUL K. ERICSON and Miss Gail P. Waitt on August 11, 1973 in Rochester, New Hampshire. Mrs. Ericson graduated from Clark University. The groom is with Van Zelm, Heywood, and Shadford, West Hartford, Conn.

Married: STEVEN E. GALLANT to Miss Karen Ann Casavant on June 23 in Gardner, Massachusetts. The bride, who is a graduate of Worcester Junior College, is a senior computist with Pratt and Whitney, East Hartford, Conn. Her husband is with Hamilton-Standard, Windsor Locks, Conn. . . . JOSEPH A. KALINOWSKI and Miss Patricia A. Recko in Worcester on August 25, 1973. The bride, a Becker graduate, is a secretary at the same college. . . . FRANK A. KANIA and Miss Denise A. Riopel on August 25 in Leicester, Massachusetts. Mrs. Riopel is a data processor at Jamesbury Corp., Worcester. Her husband is employed by Rotmans Warehouse & Showrooms. . . . RONALD J. LAK to Miss Cynthia J. Tamashunas on August 25, 1973 in Hudson, Massachusetts. The bride was employed by New England Tape Co. Mr. Lak is with Uniroyal Chemical Co. in Connecticut.

Married: BARRY S. MENDELOFF to Miss Diane C. Kelley of Worcester last summer. The bride attended Salter Secretarial School. Her husband is with the Hamilton Standard Division of United Aircraft, Windsor Locks, Conn. . . . MARK R. OLESON and Miss Daralee Ann Nutting on July 28 in Boston. Mrs. Oleson is a graduate of Brockton Hospital School of Nursing. The bridegroom is with Stone & Webster, Boston. . . . JOHN D. PERREAULT and Miss Joyce Bartlett on July 1, 1973 in Shrewsbury, Massachusetts. The bride teaches at Beal School, Shrewsbury. Her husband works for the Worcester Department of Public Works. . . . JAMES A. RISOTTI to Miss Deborah J. Carroll on September 1 in Worcester. Mrs. Risotti is a graduate nurse. The bridegroom is with General Electric Co., Erie, Pa.

Married: ROBERT C. SYKES and Miss Dorothy M. Alger in Worcester on August 10, 1973. The bride was a staff nurse at the Memorial Hospital School of Nursing. Her husband is with Dupont Co., Bridgeport, Conn. . . . ANGELO P. TSEFREKAS and Miss Iphegenia Trempelas on July 1, 1973 in Watertown, Massachusetts. The bride is an instructor of home economics in the Bedford school system. The groom is a member of the administration staff of Framingham Union Hospital. . . . HARVEY A. VIGNEAULT to Miss Deborah Anne Grocut on August 18, 1973 in Worcester. Mrs. Vigneault was employed at Paul Revere Life Insurance Co. The bridegroom is with Combustion Engineering, Windsor, Conn. . . . ALAN E. WARENDA and Miss Patricia A. Pannese on August 5, 1973 in Worcester. Mrs. Warenda graduated from Quinsigamond Community College. Her husband is employed by New Departure Hyatt, Bristol, Conn.

SURESH K. AMIN is a quality control engineer for Okonite Co., Worcester. . . . STEVEN W. BRENNAN is at the Naval Ordnance Station in Indian Head, Md. . . . CHRISTOPHER A. BRODERS has accepted employment with Texas Instruments. . . . PAUL B. CONTI has joined the engineering department at Cranston Print Works Co., Webster, Mass. . . . KEVIN J. CROSSEN is attending graduate school at the University of Rhode Island. . . . MICHAEL E. DeCOLLIBUS works as a manufacturer's engineer with Torrington Bearing Co., Torrington, Conn. . . . MICHAEL GREENBAUM has been accepted at Rutgers University Law School. . . . GEORGE J. GRUNBECK is a field engineer with General Electric's Installation and Service Engineering Department, Schenectady, N.Y. . . . DAVID E. HAFLICH is a graduate student at Stanford University, Stanford, Calif. . . . HARRY A. KASPARIAN works for Metcalf & Eddy, Boston. . . . DAVID C. KAY works for General Electric Company.

RICHARD L. KIRK is a physicist for Sanders Associates, Nashua, N.H. . . . MICHAEL J. KOWALESKI has joined Southern New England Telephone Co. . . . FREDERICK C. LEVITSKY has been employed by General Dynamics, Electric Boat Division. . . . PAUL A. LEWIS is a field engineer at Factory Insurance Association, Buffalo, N.Y. . . . ROBERT C. MACKENZIE serves as an environmental engineer in the Design Services Division at the New Hampshire Highway Department, Concord, N.H. . . . PHILIP C. MAZZOLA is a graduate student at the University of Kentucky. . . . DAVID E. MOOMAW is an engineer-in-training at Fisher-Price Toy Co., East Aurora, N.Y. . . . RICHARD D. NORLIN works as a research assistant in the Dept. of Nutrition, Harvard School of Public Health, Boston. . . . NAZIR A. QURESHI is with Sargent & Lundy Engineers, Chicago.

DOROTHY L. O'KEEFE has been awarded a research assistantship at WPI where she is studying for her master's degree. . . . PAUL J. PARULIS is a research and development engineer at Richmond Screw Anchor Co., Bronx, N.Y. . . . PETER R. PASTORE works for Metcalf & Eddy, a New York based engineering firm which specializes in community planning. . . . ELIZABETH POULIN is employed by Stone & Webster in Boston. . . . PETER B. RUNYON has been employed as a field engineer with General Electric's Installation and Service Engineering Department in Schenectady, N.Y. . . . PETER A. SHAW is in technical service, marketing, in the Elastomers Department, Dupont, Wilmington, Delaware. . . . NORMAN D. STALLER, now a WPI graduate student, placed fourth in a nationwide engineering student design contest sponsored by Lincoln Arc Welding Foundation of Cleveland. As a senior he entered his design of an automatic feeding device for an impactor machine. For his invention he will receive a $250 prize with WPI receiving a $300 grant.

JOHN F. STASAITIS is with Riley Stoker, Worcester. . . . JOSEPH J. STASZOWSKI works for the Public Service of New Hampshire. . . . ROBERT N. TORBIN has joined Stone & Webster in Boston. . . . JAMES A. VIVEIROS has been employed by Cottrell Company, Westerly, R.I. . . . PAUL M. WATSON is attending graduate school at Northeastern University, Boston. . . . JOHN P. WOLKONOWICZ works for the electrical division of Stone & Webster in Boston.

Completed Careers

LYNN I. SCHOONOVER, 86, former acting head of the economics, government and business department at WPI, died August 6, 1973 in Worcester.

A native of River Falls, Wis., he later studied at the University of Wisconsin where he graduated in 1912. Before coming to Worcester he taught in the public schools of Sioux City, Iowa; at the University of Iowa School of Business; and at Harvard School of Business Administration. Professor Schoonover served at WPI from 1947 until 1963. He then became head of the finance department at Northeastern University and a lecturer at Becker Junior College.

He was the husband of Mrs. Bonnie-Blanche Schoonover, librarian emeritus at WPI.

ARTEMUS O. WILKINS, '09 died September 3, 1973 at the age of 88 in Bridgton, Maine following a long illness.

He was born in Wardsboro, Vt. After studying at WPI he became a machinist, owning and operating the Wilkins Machine Shop in Brattleboro, Vt.; Cambridge, Mass.; and Everett, Mass. For a number of years he worked at Howell Laboratories from which he retired at the age of 83.

During World War II he worked at Harvard University helping to develop a counter-radar system known as the "Window Project."

For over 25 years he had served as selectman and a member of the Planning Board and Chamber of Commerce in Bridgton. Twice he was national president of the Railroad Enthusiasts of America.

WILLIAM R. BELL, '10, the retired vice president and principal officer of New England Power Co., passed away on August 15, 1973 in Holyoke, Massachusetts. He was 85.

He was born in East Longmeadow in 1888 and graduated as an electrical engineer from WPI in 1910. Early in his career he was a testman for General Electric Co. For 42 years he was associated with the New England Electric System (New England Power Co.) where he was named principal officer in 1952.

Mr. Bell was a former Alumni Council representative from the Boston chapter. He belonged to AIEE, NELA, and the Boston Society of Engineers.

DANIEL H. REAMY, '10 passed away on September 20, 1973 in Fort Myers, Florida.

A native of West Medford, Mass., he graduated from WPI as a mechanical engineer in 1910. From 1926 until 1949 he was a machine shop instructor and department head at Whittier Union High School, Whittier, Calif. He also taught at a number of other high schools and held engineering positions with General Electric Company and Douglas Aircraft Co. For several years he was a machine shop instructor at Kamehameha School for Boys, Honolulu. Later he retired to Fort Myers.

Mr. Reamy belonged to the National Education Association, American Vocational Association, California Industrial Education Association, and the California Teachers Association.

IRVING L. STOWE, '14 of West Millbury, Massachusetts passed away on August 2, 1973.

He was born in West Millbury on December 26, 1892. After studying civil engineering at WPI, he worked for three years at Graton & Knight Mfg. Co., Worcester. Later he became a self-employed farmer.

Mr. Stowe belonged to Sigma Alpha Epsilon Fraternity.

HENRY C. WHITLOCK, '14, an engineer for the City of Waterbury, Connecticut for 52 years, died in Waterbury on August 22, 1973. He was 80.

A native of Naugatuck, Conn., he later graduated from WPI as a civil engineer. He started working for the City of Waterbury in 1915. In 1947 he was appointed chief engineer. It was under his direction that most of the city's water mains, sewer lines, and roads were constructed. He retired in 1971, long after the usual mandatory retirement age, because the city felt that his services were too valuable to lose.

Mr. Whitlock was a member of Sigma Phi Epsilon, formerly Delta Tau.

CAPT. ROBERT E. HANCOCK, '15 (USN, ret.) died July 31 in Jacksonville, Florida.

He was born in Erving, Massachusetts on October 28, 1889 and received his BS in electrical engineering from WPI. In 1915 he joined what is now known as Northeast Utilities Co. where he worked in the design and construction of power plants and transmission lines.

During World War I he was commissioned an officer in the regular Navy after having been an officer in the Civil Engineer Corps of the U.S. Naval Reserves. In 1942 he attained the rank of Captain. During World War II he was Officer-in-Charge of the multi-million-dollar expansion of the New York Naval Air Station (Floyd Bennett) on Long Island, N.Y. and the Casco Bay Area at Portland, Me. He was also Public Works Officer at the Navy Ship Yard at Portsmouth, Va. Prior to his retirement in 1947 he headed the Power Plant & Distribution Division of the Bureau of Yards and Docks, Navy Dept., Washington, D.C.

Capt. Hancock belonged to the Navy Civil Engineering Association, Alpha Tau Omega, and Skull. He was a registered professional engineer in Massachusetts and Maine.

RICHARD L. OLSON, '19, chairman of the board and former president of Olson Manufacturing Co., Holden, Massachusetts, died August 19 in Worcester at the age of 77.

A Worcester native, he studied mechanical engineering at WPI. Following service with the Army Air Corps in World War I, he was named assistant treasurer at Olson (screw machine) and later assistant to his brother, Robert, who was president and founder of the company. He became president in 1948 and chairman of the board in 1962.

Mr. Olson was a director of Guaranty Bank & Trust Co., Worcester, and a past director of the Worcester County Purchasing Agency. He belonged to the Worcester Mechanics Association.

CARL G. ENGLUND, '20 died August 8, 1973 in Jacksonville, Florida after a lengthy illness. He was 75.

He was born in Worcester and graduated from WPI as a civil engineer. During his career he was associated with the U.S. Bureau of Public Roads; Potter & Shackelford, Inc., Greenville, S.C.; and Daniel Construction Co. of Florida in Jacksonville where he served as vice president and later, after semi-retirement, as a consultant.

Mr. Englund was a member of Tau Beta Pi. He was the brother of Theodore J. Englund, '28.

ALEXANDER L. WILSON, '21 passed away September 8, 1973 in Illinois.

He was born on December 4, 1898 in Worcester, and later studied at WPI where he was a member of Theta Chi Fraternity. In 1924 he received his BSCE from the University of Illinois. From graduation until his retirement in 1964 he had worked in many phases of Mississippi Valley Structural Steel Co. With G. A. Caldwell he was co-developer of the first movable welder which was used by MVSS in construction of the Sky Ride at the Chicago World's Fair commemorating "A Century of Progress" in 1933.

ROBERT W. CUSHMAN, '22 died on September 17, 1973 in Pennsylvania following heart surgery.

He was born at Brattleboro, Vt. on June 22, 1901 and graduated from WPI as an electrical engineer. During his career he was associated with the Charles H. Tenney Co., Boston, and Central Hudson Gas and Electric Co., Poughkeepsie, N.Y., where he worked until May 1945 when he went to Radio Research Laboratory at Harvard University as a special research associate. At the end of the war he became an employee of the U.S. Navy and was stationed at the Naval Air Development Center at Johnsville, Pa. as an electronic scientist.

In 1966 he retired and was appointed zoning officer and building inspector for the Borough of Newton, Pa. He was a member of IEEE.

JAMES A. HILLMAN, '24 of Grand Island, New York died on July 3, 1973.

He was born in New Bedford, Mass. After graduating from WPI as a chemist in 1924 he joined Allied Chemical where he served as a supervisor for the National Aniline Division in Buffalo, N.Y. for many years.

Mr. Hillman was a past president of the Western New York Chapter of the Alumni Association. He belonged to the American Chemical Society.

DANIEL S. HORGAN, '30, retired chief engineer at the Massachusetts Department of Public Works, died in Worcester on August 10, 1973. He was 64.

A native of Worcester, he later studied civil engineering at WPI. He started as an engineering aide with the DPW in 1929. During his 43 years of service he worked in all of the divisions of the department—survey, construction, maintenance—and was named chief engineer in 1964. He originated the idea for the southeast connector between the Worcester Expressway and the Massachusetts Turnpike and had a hand in the construction of Route 9 and Route 20. In 1962 he was named chief waterways engineer, the position he held prior to his final promotion to DPW head. He retired earlier this year.

Mr. Horgan was a former director of the Massachusetts Society of State Engineers, the Massachusetts Society of Professional Engineers, American Roadbuilders Association, Massachusetts Safety Council, and the National Society of Professional Engineers.

In 1951 he was awarded the Silver Beaver by the Boy Scouts, the highest honor scouting can bestow. In 1972 he was given the Man of the Year Award by the Auburn (Mass.) Chamber of Commerce.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

(Act of August 12, 1970: Section 3685, Title 39, United States Code)

1. Title of publication. WPI JOURNAL. 2. Date of filing. September 28, 1973. 3. Frequency of issue. Six times per year (August, September, October, December, February, April). 4. Location of known office of publication (Street, city, county, state, zip code). Institute Road, Worcester, Worcester County, Massachusetts 01609. 5. Location of the headquarters or general business offices of the publishers (Not printers). Institute Road, Worcester, Massachusetts 01609. 6. Names and addresses of publisher, editor, and managing editor. Publisher (Name and address). Worcester Polytechnic Institute, Worcester, Massachusetts 01609. Editor (Name and address). H. Russell Kay, Worcester Polytechnic Institute, Worcester, Mass. 01609. Managing Editor (Name and address). None. 7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.) Worcester Polytechnic Institute, Worcester, Massachusetts 01609. 8. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities (If there are none, so state). None. 9. For completion by nonprofit organizations authorized to mail at special rates (Section 132.122, Postal Manual). The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes have not changed during preceding 12 months. (If changed, publisher must submit explanation of change with this statement.) 10. Extent and nature of circulation.

	Average No. Copies Each Issue during Preceding 12 Months	Actual Number of Copies of Single Issue Published Nearest to Filing Date
A. Total no. copies printed (Net press run).	15,535	17,700
B. Paid circulation.		
1. Sales through dealers and carriers, street vendors and counter sales.	0	0
2. Mail subscriptions.	0	0
C. Total paid circulation.	0	0
D. Free distribution by mail, carrier or other means.		
1. Samples, complimentary, and other free copies.	14,888	14,753
2. Copies distributed to news agents, but not sold.	0	0
E. Total distribution (Sum of C and D).	14,888	14,753
F Office use, left-over, unaccounted, spoiled after printing.	647	2,947
G. Total (Sum of E & F—should equal net press run shown in A).	15,535	17,700

I certify that the statements made by me above are correct and complete.

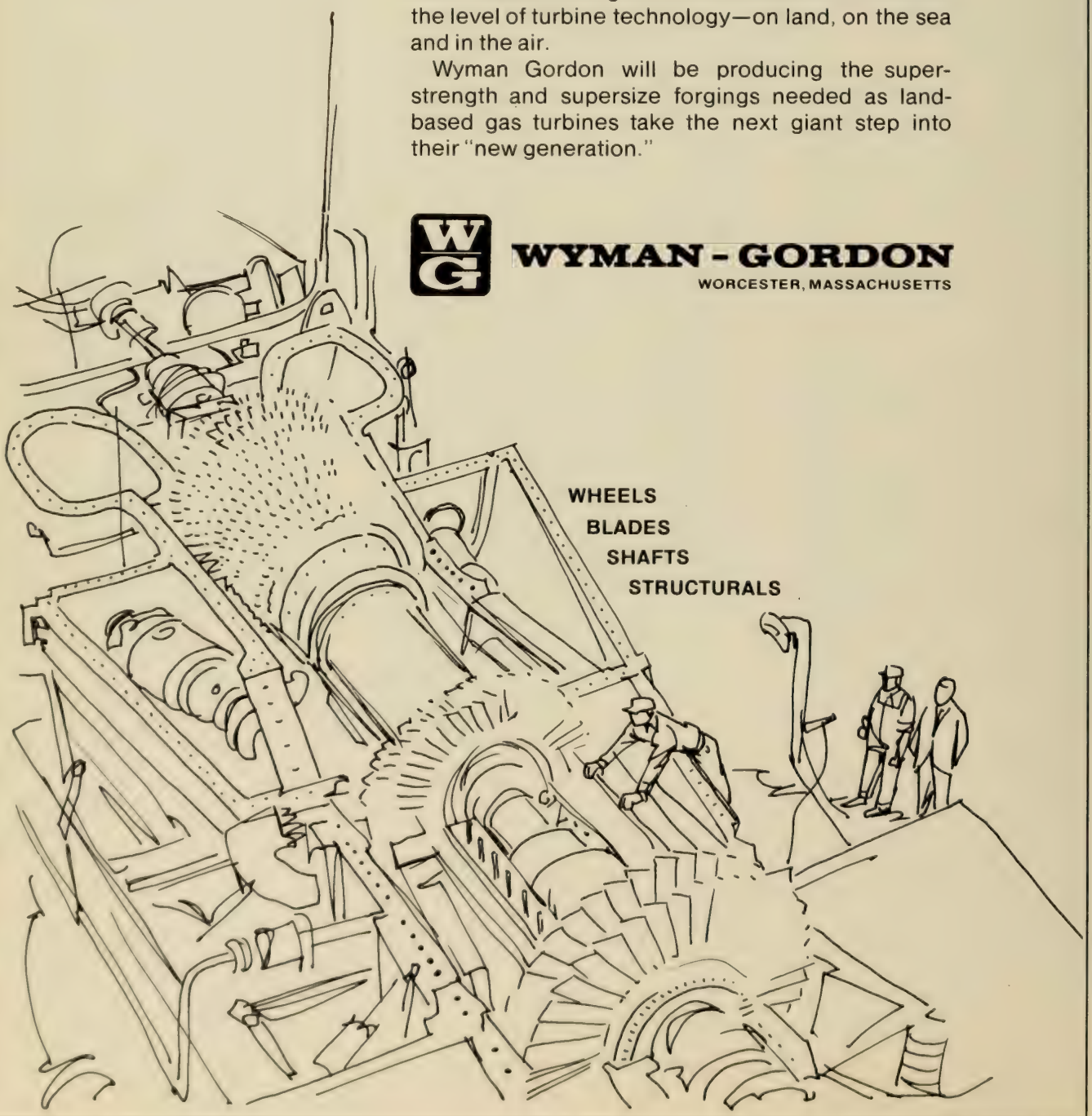
H. Russell Kay, Editor

Forging for the new generation of turbine engines

Wyman Gordon's mechanical/metallurgical skills have allowed designers and fabricators to stretch the level of turbine technology—on land, on the sea and in the air.

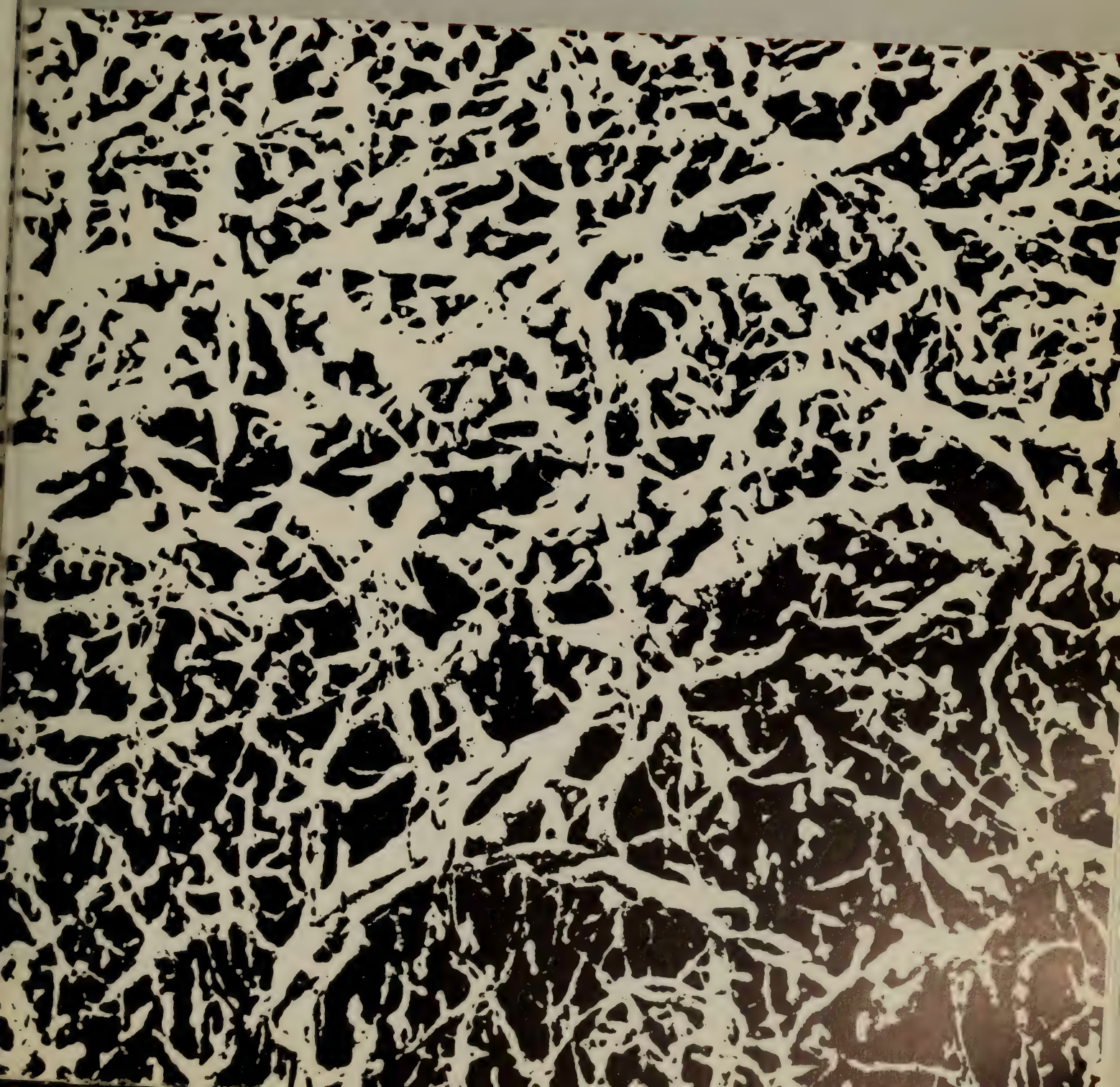
Wyman Gordon will be producing the super-strength and supersize forgings needed as land-based gas turbines take the next giant step into their "new generation."

WG **WYMAN-GORDON**
WORCESTER, MASSACHUSETTS



february 1974

wpjournal



feedback

Letters to the editor are welcome. All points of view can find a forum in this section, and we encourage the exchange of ideas and opinions here. For reasons of space, variety, timeliness, and interest to other readers, we may not publish all letters received and will occasionally excerpt portions of letters, but those that do appear here are an accurate reflection of our mail.

I am forced to comment on the "WPI Journal." From a sensible publication it has become "cutesy".

The "Journal" appears to have been assembled, like the giraffe, by a committee —the freshman printing class at a slum trade school. Instead of dealing in vague opinions, let's examine a few facts.

In the past several years, publication has been advertised as four, five, or six times per year. Delivery is erratic. Some issues were either not printed or not delivered. The mailing label on the December, 1972, issue arrived detached because of improper adhesive. I have an issue labeled Vol. *74, Fall,* with three small cover photos on a blue-line design on a white background (delivered December 18, 1969). I have another issue labeled Vol. *74, Fall* 1970, with a U.S. map on an orange cover (delivered January 7, 1971).

Volume 76-6, page 24: "The second half of the 'Where are you?' list will be run in the August issue." Of what year? Volume 76-4, back cover: Showing the British flag above the American flag is not only bad taste but may be illegal.

The cover of the February, 1972, issue was printed on recycled paper. Well, la-de-da! If that and subsequent issues had eliminated the unused white space throughout, we could have saved a couple of forests. The ultimate stupidity was the design of the October, 1973, cover—lots and lots of wonderful white space laid out so that the address label could be pasted over the photo caption.

And in the October, 1973, editorial you tell us of a special citation? Are you sure it wasn't the booby prize?

Picky, picky, picky! Anyone who makes that remark will reveal that he knows nothing of the havoc that is created in the industrial world by simple mistakes, 6" for 6', for example. You need six-foot diameter pipe for hydro station penstocks, and you get six-inch pipe. You want supports every six inches, and the welder installs them six feet apart. A toaster manufacturer needs six-foot power cords to meet the Christmas rush and gets 100,000 cords six inches long. Remember, every mistake you make is multiplied 15,000 times.

"First-class men hire first-class men; second-class men hire third-class men." What 37th-class boob hired the 75th-class idiot who puts the "Journal" together? (And some little typist has just run into the ladies' restroom, sobbing, "I have only one pair of hands!")

I have the impression that the "Journal" is a reflection of WPI in general. They seem to be going down the drain together. Since about 1968 I have not had the slightest interest in WPI. The reputable Institute had degenerated beyond recall. Within a week after my graduation I had discovered that the WPI way was archaic and not the modern, commercial way—the result of staff negative inbreeding. By 1970, WPI was the case of the deaf, dumb, halt, blind, and idiotic leading the innocent. The institute propaganda has so informed me—constantly.

The Institute has financial difficulties? The appeals for funds could be compared to Mr. Rockefeller riding up in his Cadillac and sending his chauffeur to my door, begging alms. WPI is supposed to be training people and developing their common sense so that they can use materials and techniques effectively and economically. "Doctor, cure thyself!" However, the years have shown (unless the literature lies) that WPI cannot function and apply its assets to best advantage. Priorities!

If the nation as a whole is in trouble, a full share of the blame can be laid on the doorstep of Boynton Hall.

My greatly-reduced annual contributions have been donations to charity—mainly to pay for the subscription to the "Journal". I *enjoy* reading the obituaries. (And I notice that white-space requirements now necessitate the omission of survivors.)

Please don't waste your time and postage on a reply to me; your efforts, it is evident, are sorely needed elsewhere. And don't waste postage sending me a receipt. For many decades my cancelled checks have served adequately as receipts. If WPI had sufficient business acumen within its ranks, it would not have to send forth its prominent alumni to beg. WPI is soliciting funds from me. I'm not seeking handouts from WPI. Think about that.

You say that you don't print negative letters because you get none. Now you have one. Fill up some of that idle white space. (If you're not going to use the white space, send it to the bathroom tissue factories. Rumor says they need it badly.) (It would be fitting if the present "Journal" were printed on bathroom tissue.)

Joseph W. Blaine '42
Newport, R.I.

WPI journal

Vol. 77, No. 5 February 1974

0 **Feedback**

2 **The Journal Readership Survey: What You Had to Say**
The editor analyzes the returns from the questionnaire in the August issue.

7 **Skis: They Ain't Barrel Staves Anymore**
by Bryan A. Kashiwa, '73
The former star of the WPI Ski Club offers some insight into just what makes a ski work.

12 **Snow and Ice**
by Russell Kay
A photographic guessing game.

18 **Your Class and Others**

22 **Where Are You?**
The second half of our "missing alumni" list—can you help us?

30 **Completed Careers**

Front cover: A winter detail at WPI—reproduced in more normal form on page 17.

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, Chairman; Donald F. Berth, '56; Richard DeChard, '56; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography and printing: Davis Press, Worcester, Massachusetts.

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal*, Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1973 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. Postmaster: Please send form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

WPI Alumni Association

President: W. J. Bank, '46

Vice Presidents: L. Polizzotto, '70; F. S. Harvey, '37

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr., '44

Executive Committee Members-at-Large: C. W. Backstrom, '30; B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55

Fund Board: R. F. Burke, Jr., '38, Chairman; W. J. Charow, '49, Vice Chairman; L. H. White, '41; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

The Journal Readership Survey:

What You Had To Say

by Russell Kay

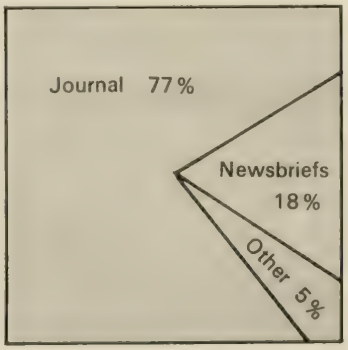
RESPONSES to the readership questionnaire in the August Journal indicate that, by and large, alumni seem to like the direction the Journal has taken over the past few years as compared with earlier issues. Journal readers want more news of WPI and the campus, of job and career and professional activity and possibilities, and of the application of technological skills in solving pressing current problems.

At the same time I report these conclusions, I would enter one caveat. When the questionnaire was published, the Publications Committee was hoping for a 10 to 20% response. As an example, a recent survey by Cornell University's *Engineering Quarterly* generated 25% responses. But it didn't happen here. Of the 10,588 living WPI alumni, only some 400 returned the questionnaire. The information to be presented below is based on the tabulation of 380 responses — 3.6%. The respondents closely parallel the total alumni population in terms of age distribution and geographical residence, as I will show later. Demographically, the 3.6% seem quite representative of the 96.4% who didn't answer, and this leads us to believe that their feelings and opinions are also an accurate representation of the total.

The Results in Detail

In this section I will present the results of the survey along with certain demographics and some discussion of the more involved questions. To eliminate the tired eye syndrome that inevitably comes from looking at too many figures neatly arrayed in tables (I am quite familiar with this condition after wading through the hundreds of pages of computer printout that resulted from this survey!), the information will be presented in graphic form whenever possible. Unless stated otherwise, all figures refer to percentages of the total number of responses to each question, rounded to the nearest whole number.

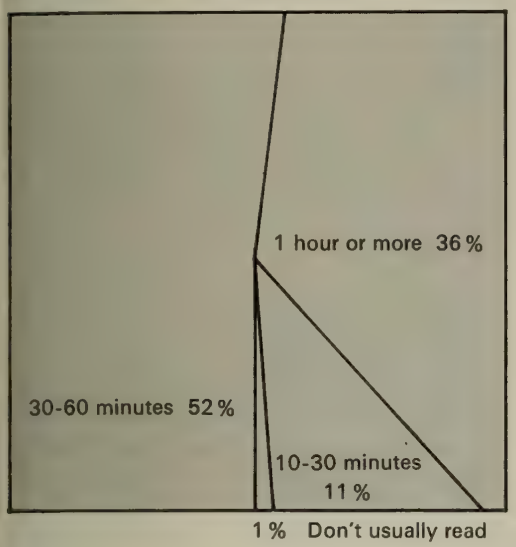
Best single source of information about WPI



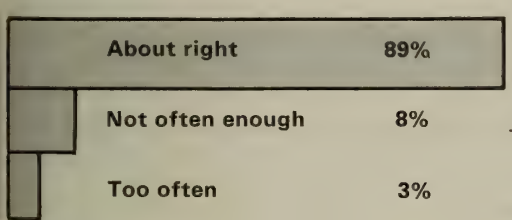
How much of the Journal do you read?

Feature articles	17	39	43	1
Alumni activity reports	22	33	38	7
Sports reports	22	22	37	19
Alumni fund reports	17	25	44	14
Class notes	34	33	32	1
Completed Careers	27	28	38	7

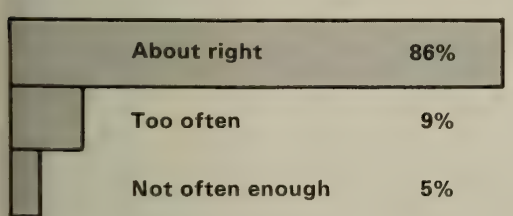
How much time do you spend reading each Journal issue?



Frequency of Journal publication



Frequency of all information from WPI and Alumni Association



The Purpose of the Journal

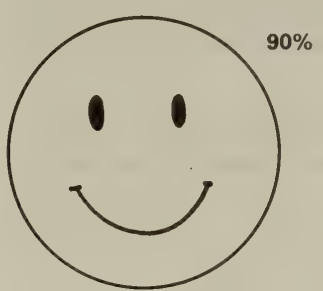
Asked to rank various items in order as main purposes of the Journal, respondents clearly indicated that alumni news was first (47% ranked it so) and campus news was second (21% ranked this first, 41% second). The stimulation of alumni participation in WPI and Association activities came further down, and the stimulation of alumni contributions was a clear last choice (32% ranked it fifth of five given choices, and 11% marked it not a purpose).

One of the key questions the Publications Committee and I were interested in was how continuing education would fare in this questionnaire, because we adopted this (and the Association's Executive Council endorsed it) as a basic *raison d'etre* for the magazine in a statement of policy published two years ago. Survey respondents, however, split very evenly on the issue: 24% ranked it the first purpose, 12% second, 24% third, 10% fourth, 21% fifth, and 9% considered it not a proper purpose of the Journal. Strongest support for continuing education came from the youngest alumni group identified (classes of '68 to '73, with 34% ranking it first) and from the oldest (prior to the class of '33, with 29% ranking it first).

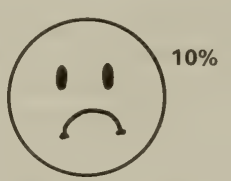
Do you feel the Journal has changed over the past two years in the following areas?

	Yes	*No*
Types of feature articles	95	5
Editorial style of articles	86	14
Use of illustrations	78	22
Style and layout	89	11
Cover designs	95	5
Treatment of traditional departments and articles	58	42

This question did not leave any room for judgment whether the reader considered change to be good or bad. Two-thirds of the respondents wrote in comments here, or later on, that enabled us to derive the following statistic:



Like the changes, like the current Journal



Don't like changes, preferred older Journals

Degree of interest in areas of Journal coverage

The results of this question seemed to bear out the pattern shown in the previous question on purpose and the earlier question about the readership of various sections. Respondents were here asked to rank each of nine types of Journal articles and departments on a four-point scale: strong interest — interest — slight interest — no interest. While a complete tabulation is presented below, the results, briefly, show readers

	Strong Interest	Interest	Slight Interest	No Interest
Feature articles for continuing education	22	42	27	10
News of alumni and alumni activities	51	39	9	1
Biographies and background stories on prominent alumni and faculty	33	47	17	3
News of campus activities	33	47	18	3
Sports reports	17	32	32	19
Class notes	57	32	10	1
Completed Careers	26	37	32	6
Alumni fund reports	8	40	42	11
Letters to the Editor	10	39	38	13

most interested in class notes, followed closely by alumni news. Campus news and biographies/background stories on prominent alumni and faculty came next, with virtually identical distribution of answers. Next in line came feature articles for continuing education and obituaries. Bringing up the tail end, in order, were letters to the editor, alumni fund reports, and sports reports. The bottom placing of these last few becomes clearly evident in the "no interest" column.

Several patterns relating to age and area of employment show up in this question. Feature articles held strongest interest for young alumni ('68-'73: 44% strong interest) and those in education (32% strong) and research (29% strong interest); they were least interesting to the oldest alumni group (prior to '33: 15% indicated no interest). Young alumni were, by a sizable margin, more interested in news of WPI and the campus. Three areas showed a definite increase in interest with increasing age: class notes, obituaries, and alumni fund reports. The trend is particularly strong for obituaries, where 64% of the oldest alumni group indicated they read all of them in each issue, and 56% showed strong interest in responding to this question.

One curious item to emerge is that, of all job categories in this survey, those respondents in corporate management — men who presumably must know their way around money matters and figures — showed least interest in alumni fund reports — 21% said "no interest."

Have you been conscious of any differences between the Journal and Newsbriefs?

Yes	84%
No	16%

Who Was It Sent in These Questionnaires, Anyway?

As we mentioned before, this 3.6% sample is remarkably close to the total alumni population in age and geographic distribution. The actual figures look like this:

WPI class	% Responding	% of Total Alumni
'68-'73	14	21
'63-'67	14	14
'53-'62	21	20
'43-'52	16	18
'33-'42	14	13
prior to '33	21	15

Residence	% Responding	% of Total Alumni
Worcester County	10	15
Other Massachusetts	19	15
Other New England	18	18
Subtotal	(47)	(48)
Other Northeast	14	
Mid-Atlantic	14	
Subtotal	(75)	(67)
South	6	
Midwest	9	
Southwest	2	
Far West	7	
Outside U.S.	0.3	

The only deviations here are easily explained by common-sense reasoning. The youngest group would, naturally, be most bound up in their present and future concerns and least likely to be concerned with their immediate past. The oldest group, on the other hand, would naturally be more interested in their past; and since most of them are retired, they also have more time for such things as questionnaires.

What are they doing?

Of those who sent in questionnaires, 50% describe their jobs as supervisory, 22% as non-supervisory, 9% as self-employed, and 19% as retired. Their job areas broke down as: engineering (40%), corporate management (12%), research (10%), marketing and sales (9%), education (8%), manufacturing (7%), administration (5%), and "other" (8%).

Nearly half the respondents didn't check any of the boxes indicating extent of alumni activity.

The Comments

We gave readers a real chance to talk back to us in this survey (we even paid the postage), and most took the opportunity to mention their feelings about the Journal, about WPI, about life. . . . There were both negative and positive comments, and many seemed happy to get something off their chests. The single type of article most requested was more information on the WPI Plan. The next biggest call was for articles dealing with the applications of technology to important current problems: pollution, energy, evnironmental concerns, urban problems, transportation. There seemed to be great concern with jobs and career opportunities, and many wondered about the effects of the WPI Plan on these.

We print below some of the more interesting and thoughtful comments, with an occasional editor's reply to the (usually) anonymous reader.

☛ The change in WPI educational approach came as a shock to this old hand—'16—but the more I learn of it the more sure I am that it is correct and should have come earlier.

☛ The Journal is essentially a throw-away magazine, once glanced over—I don't feel you need to spend as much on a "slick paper" production. Editorial content and paper quality need not be related or dependent.

There isn't paper available much cheaper than what we now use except for newsprint.

☛ Most of the completed careers I read are about men I knew. Therefore, I would prefer that they be referred to by their first name. "Mr." indicates that the writer never knew them personally.

☛ The continuing liberalization of curriculum at WPI away from solid engineering has steadily decreased my desire to contribute to the school. I see so many B.S. artists (that's bullshit) in engineering positions who don't know engineering fundamentals that I feel schools are teaching only surface subjects. How about Dr. Moruzzi's "learn the basics or flunk" approach? That's where I learned to pay attention to details and basics. It's the only approach that get's engineering work done . . . (*and from the same person*) . . . Newsbriefs goes into the trash immediately.

☛ When I read of the conversion of my beloved foundry into the status which approaches a ladies' lounge, my depression is so deep that I hardly care what happens at WPI. I go to the basement and stare at my old hand grinder which was born in the foundry.

The foundry is not *being converted into anything which "approaches a ladies' lounge"; it is being changed into a Project Center, a place where students can work on projects (which are degree requirements), where they can construct equipment and apparatus they may need, where they can receive technical assistance. In fact, in many ways the Project Center represents a return to the oldest traditions of WPI, with emphasis on application as well as theory. To be sure, the Project Center does* contain *a ladies' "lounge"; after all, there will be women students using the building and they have physical needs too. Finally, when you look at your old hand grinder, think of how today's students will feel in twenty or thirty or forty years as they contemplate items—tools, apparatus, models, etc.—that they will have designed and built themselves using the resources of the Project Center. And it's a far better use for the foundry building than the Buildings and Grounds workroom and garage that it has been since 1958.*

☛ How about printing job opportunities in the $25,000 to $50,000 category?

☛ Ways the Journal can be improved: Cease publication.

Gesundheit.

☛ The avant-garde covers leave me cold. The old "campus view," to me, was more appropriate.

☛ Liked the cover on this issue; a credit to your effort.

☛ I am not aware of any "needs" that the Journal could help to provide.

☛ I personally don't find time to read WPI material and believe it wastes alumni funds to which I donate regularly.

☛ The Journal is a lot of work to you for a very minimal interest to me—could be considered by some to be both a waste of time and money.

☛ Too much emphasis on contributions.

On the other hand:

☛ Keep up the high standard of your publications.

☛ The editor's job is almost a thankless task; I wouldn't want it and he has my sympathy.

☛ The "new" Journal is superb! I have no idea as to its costs, but as far as I'm concerned it's the best thing that we've ever had insofar as keeping the alumni and school together. Keep it up.

☛ Out with the Newsbriefs. More about campus and what a visiting alumnus might expect to find. Less noise about alumni babies. Try to justify why the Institute deserves our continuing financial support.

☛ Write more about WPI people—there are plenty of special, technical oriented magazines with articles of technical interest—too many to read! Why add more?

☛ It's fine to remember the past; they were great times, but that only goes so far. In addition to that, keep the information articles that educate as well coming. Alpha and Omega is an excellent example.

☛ I much prefer the old WPI Journal. Some of the technical articles are too deep for me, such as appeared in a recent issue. I don't recall the title, but it had to do with technology.

☛ The concept of continuing education as a purpose for the Journal is interesting. I think some tentative steps have been taken in this direction.

☛ I don't read the Journal to be educated; nor am I practicing as an engineer. I am interested in knowing where my friends are and what they are doing.

☛ WPI is moving in the right direction. This is the result of having an outstanding educator as administrator instead of a retired military person waiting for retirement.

But it was one of those retired military persons, President Harry Storke, who personally initiated the faculty self-study program that developed the WPI Plan.

SO, FOLKS, that's what we learned from the survey. The many suggestions for articles were appreciated and should result in more interesting reading in the issues ahead. We discovered that we were not covering some areas of particular interest to readers, such as campus news, and have moved to rectify those omissions. Thank you. And thanks, too, to John Lyons and Ed Perkins of the Worcester Area College Computation Center for their invaluable assistance in tabulating the survey results.

WPI

A brief introduction to the complexities of the little-known science of ski design

by Bryan A. Kashiwa, '73

They Ain't Barrel Staves Anymore Skis:

THERE ARE BETTER THINGS to do in life," said Oliver Wendell Holmes (or was it Robert Benchley?), "than to strap boards to one's feet and slide down a mountain." That is an opinion which many people would dispute. They wait eagerly each November for the onset of snow and the opening of the ski slopes.

But what about those boards they strap on their feet? In fact, they are sophisticated vehicles with carefully engineered performance characteristics and refined behavior. It is safe to say that the average skier has little awareness of the engineering considerations that go into the design and construction of snow skis. In this article I hope to introduce *Journal* readers to some of those considerations.

In hopes of giving an explicit description without getting into a discussion which will be completely foreign to the non-skiing reader, I will attempt to define a few commonly used terms in skiing and then to draw an analogy between the relatively unknown field of ski design and the more familiar field of automobile engineering.

Before getting into the definitions necessary for a discussion on skis, it can be said that the design of snow skis consists mainly in the basic isolation of variables. The ski design engineer is continuously collecting data, both in the laboratory and on the ski slope, and sorting it out in order to determine a correlation between what is observed in laboratory testing and what is felt in on-slope performance. The experienced ski designer has a bank of performance related data – some of which can only be recorded subjectively in his mind – that allows him to determine what effects certain changes in the ski will have on its behavior in skiing; the most advanced ski designer is able to quantify these effects.

Stability and Quickness

There are two major qualities which define to a large degree the general behavior of a ski. Of course there are many other qualities which define the way a ski performs, but nothing that says more about a ski in as few words than a description of its relative stability and its relative quickness.

Stability is the relative degree to which a ski is comfortable to ride.

Quickness is the relative ease with which a ski carves a turn.

A ski is comfortable to ride if it has a solid feeling to it, meaning that as you slide along it follows a smooth path; this gives the skier a feeling of security that enables him to ski relaxed. A ski is unstable, and therefore uncomfortable to ride, if it is easily deflected in all directions both by inconsistencies in the sliding surface and by forces exerted by the skier which are not intended to change the direction of the ski. This gives the skier a feeling of insecurity and causes him to ski in a tense and stressed condition, since he must constantly work just to keep his skis aligned. Thus any given skier will become tired faster on the less stable of two different pairs of skis, for he must do more work to ski properly on the unstable pair.

A ski is quick if it carves a turn with very little effort. (Carving is an expression used to describe the turn in which the ski takes the shape of the curved path it is following, so that it "cuts" a path through the snow without sideways slippage.) A ski which is not as quick as another will require more effort to execute a turn of given radius.

The experienced ski designer has a bank of performance-related data—some of which can only be recorded subjectively in his mind. The most advanced ski designer is able to quantify these.

Obviously there are many different degrees of stability and quickness. An experienced ski tester can rate a group of skis in order of their relative quickness and stability by skiing on them in a sequence which allows him to make one-to-one comparisons between them all. The measure that he uses in doing this is the amount of work that he must do to keep the skis aligned, and the effort he must exert in turning them. For well designed skis it is found that, within a group, the most stable ski will be the least quick and the quickest ski will be the least stable; this observation is apparent in the definitions of the terms.

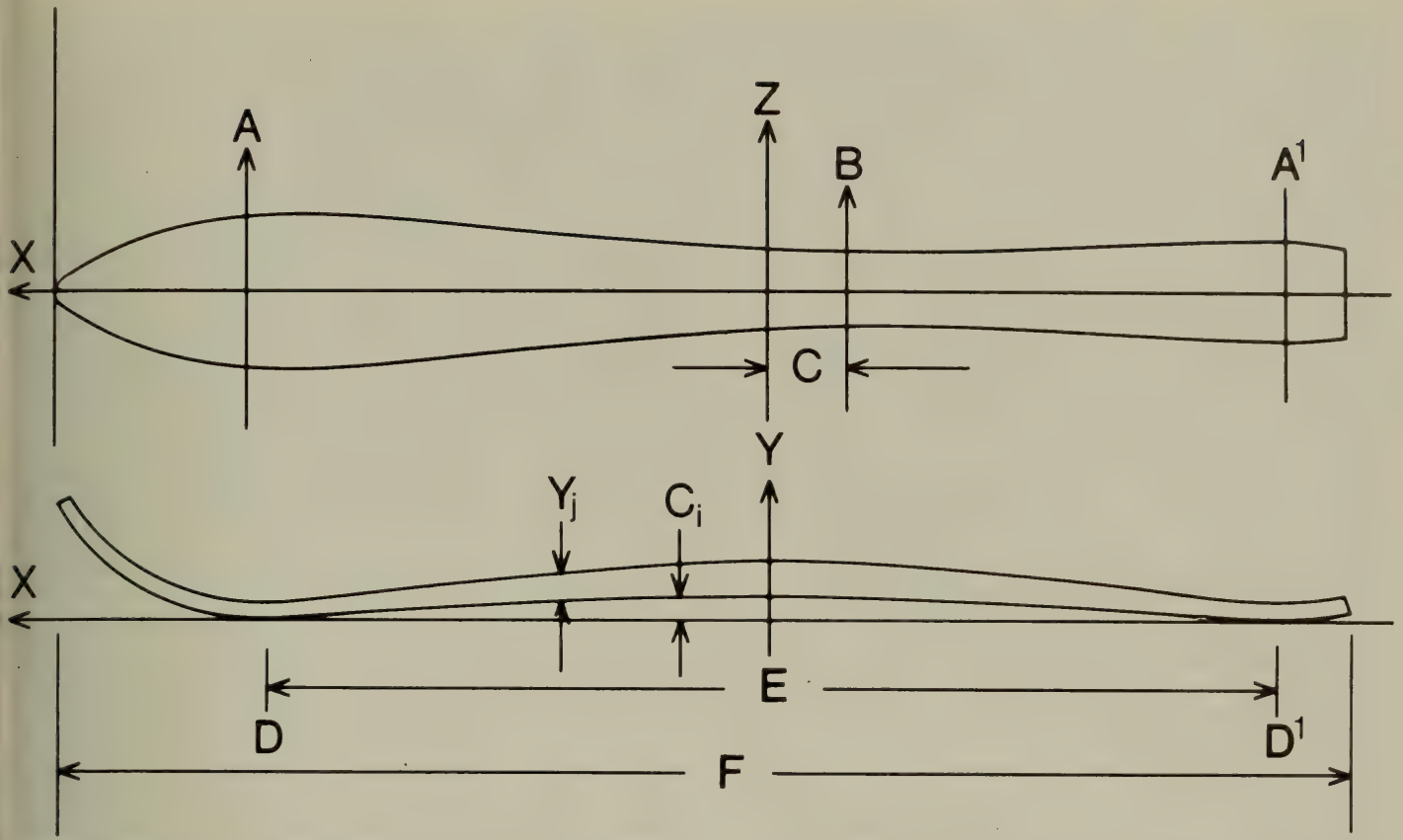
By way of analogy, consider different types of automobiles, classified in order of their riding comfort and handling qualities. At one end of the spectrum you have the large luxury cars which are very comfortable to ride in, very "stable," but are not as good in handling (in terms of turning radius, turning response, and ultimate cornering capability) as the small sporty cars on the other end of the spectrum, whose handling is much better but which do not have the riding qualities of a large limousine. Thus the automotive engineer is faced with the same situation as the ski engineer: both must strike a balance between ride comfort and good handling, and the trade-off between ride and handling, stability and quickness generates a variety of models in both fields.

The Trade-off

As we have just seen, a ski designed for maximum stability will be more difficult to turn than one designed for maximum quickness. A very quick ski will in turn be less stable, characterized by a greater difficulty in keeping the skis parallel – a difficulty magnified at high speeds. Because a ski must be deflected vertically and its linear motion changed simultaneously in order to carve a turn, a stable ski (which is not easily deflected in any direction) will be more difficult to turn than an unstable ski. A very quick ski will be easily deflected, both vertically and in a direction away from its linear motion, therefore making it less stable than a ski which requires more force to change its direction.

Now, the logical question to ask is, "Why not just build maximum stability and maximun quickness in one ski and consider it the best possible ski design?" The simple answer is that a different balance between stability and quickness is necessary for skis of different performance definitions. That is, a ski which executes large radius turns at high speeds well will not easily make small radius turns at low speeds, and a ski which makes good small radius turns at low speeds will feel unstable if a large radius turn at a high speed is attempted.

In ski racing there are three events, slalom, giant slalom and downhill, each requiring skis that differ widely in their balance between stability and quickness. A slalom ski is very quick in small radius turns; a giant slalom ski is not as quick in small turns but is stable at higher speeds and in larger turns. A downhill ski is an extreme case of the giant slalom ski, made for highest speeds. Within each of these three major divisions in the stability-quickness balance aspect of ski design, there are a number of slalom, giant slalom, and downhill skis, each having its own varying characteristics. This is a result of many



Axes of a ski and some dimensions. A and A' are the widest points fore and aft, B is the waist width, C is the waist location, D and D' are the tangency points fore and aft, E is the running surface length, F is the cord length, Y_j is the thickness at position j and C_i is the camber height at position i. The fore and aft widths, waist width and location, thickness profile and camber line, together with the mass distribution of the ski all determine the riding and turning qualities of the ski.

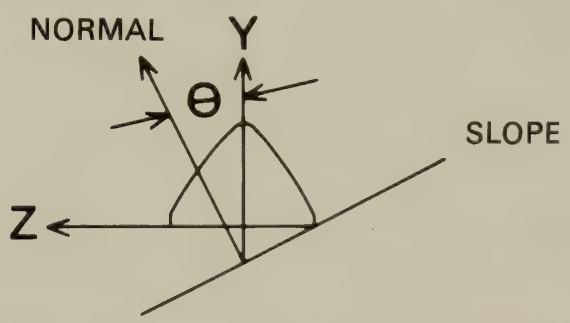
different ski racers having very different abilities and using very different techniques. Thus there is a whole spectrum of ski designs ranging from the quickest, smallest radius turning ski to the most stable downhill ski.

The Variables the Ski Engineer Works With

The analogy between the automotive design engineer's work and the ski design engineer's work can be extended still further. While both fields involve the basic performance qualities of ride and handling, such manufacturing considerations as parts fabrication, materials and assembly costs, as well as availability of materials, enter into the decisions on how to achieve certain desired qualities in the product. In addition to economic considerations, the engineer in both areas must look at physical things such as durability, fatigue life, and behavior in varying ambient conditions. In this article, however, I shall focus on the variables in design which the ski engineer has to work with in developing a ski with a given performance objective.

The engineer designing an automotive suspension system has four basic variables which he can control independently (at least to a certain degree): (1) the length and width of the wheelbase; (2) the stiffness of the springs and tires; (3) the weight of the car; and (4) the amount of damping provided by the shock absorbers. The automotive engineer has a bank of knowledge concerning the effect of these variables, both separately and collectively, on the physical behavior of the car in service. The ski designer has the same four variables, but with a different twist. For a ski of a given length, the width, stiffness, weight and dampness (yes, that's what it's called) are all distributed along the length of the ski, and there is no single numerical value that can be given to these four qualities. The essence of ski design is in the manipulation of the distribution of the four variables, in finding a way to classify the differences in this distribution and in correlating all this to the performance of the ski as a system.

The following quick run-down on each variable and its influence on the general behavior of the ski will help give a rough understanding of the function of a ski, and to further define the work of the ski designer.



Angulation. A ski has a side cut so that it will bend when angulated together with a load along its Y axis. The thickness profile, which determines the stiffness distribution, must be designed to coincide with the width distribution in order that the ski can take the shape of a smooth curve at a given angulation.

1. **Width** and its distribution, also known as side-cut, determines the radius of turn that the ski will carve for a given stiffness distribution and angulation (see figures 1 and 2). A ski with more of the width distributed to the ends (a ski with more side-cut) will bend more for a given angulation than a ski with less side-cut. Since a ski is flexible, it will bend when angulated on a flat surface while a load is applied along its y axis. The balance or symmetry between the fore and aft sections of the ski when divided in two at mid-running surface, is an important factor to the turning ability of the ski. A ski with a tail which is too wide in relation to its tip will be difficult to turn since there will not be sufficient bend in the fore section of the ski for a given angulation. A ski which has too wide a tip in relation to its tail will turn over easily since its fore section will tend to bend much more than its aft section for a given angulation. The average or overall width itself is an important factor in determining stability and quickness, simply because the wider the ski is overall, the more effort is required to deliberately angulate the ski in order to bend the ski and carve a turn. A very narrow ski will be angulated or "put on edge" easier than a ski of equal side-cut but of greater average width.

The essence of ski design is in the manipulation of the distribution of the four variables, finding a way to classify the differences, and in correlating all this to the performance of the ski as a system.

2. **Stiffness** and its distribution must be considered in three dimensions. Vertical stiffness and its distribution or the resistance of the ski to deflection in the y direction, lateral stiffness or the ski's resistance to deflection in the z direction and torsional stiffness or resistance to torsional deflection about the x axis. The vertical stiffness distribution is fixed by the thickness profile and the placement and configuration of the materials of the structure. This determines in part the carving ability of the ski and therefore influences the stability of the ski and has a major effect on the quickness. A ski with a greater overall stiffness than another will be more difficult to turn, if all other factors are the same.

If you consider the ski in three equally divided segments, and its mid-segment is too soft, then the ski will be easy to turn, but if it is too soft the ski will feel unstable. If the mid-segment is too stiff, the ski will be very difficult to bend, thus requiring more effort to carve a turn. If the forward segment is too stiff, the ski will not easily initiate a turn, since this part of the ski must begin to bend before the rest of the ski, in carving a turn. If the fore section is too soft, the skier will have an insecure feeling like driving a car with soft front tires or play in the steering wheel, since the fore section is the part of the ski used for steering (in the most conventional turning technique). If the last section is too stiff it will side-slip in an arcing turn; if it is too soft, the ski will feel sluggish, in that it will not provide a "vaulting" effect at the end of the turn. Thus the balance between the strength of the ski in its various segments is important to its turning characteristics.

In addition to the stiffness and its distribution, the camber height and its distribution is an important design criterion. A ski is cambered so that there is pressure on the snow at the ends of the ski to provide steering ability. The camber height determines the amount that the ski is loaded in its flat position and how that load is distributed, for a given stiffness and stiffness distribution. Thus the camber height is a measure of the ski's apparent stiffness, since two skis of identical stiffness will appear to be different in stiffness if they differ in camber height. Both vertical stiffness and camber height control the amount of effort the skier must exert in order to bend the ski in to a given curve. If the camber and/or stiffness is too high, the ski will be very hard to turn, if one or the other or both are too low, then the ski will have poor steering qualities, and will be difficult to keep aligned and therefore unstable.

The torsional and lateral stiffness of the ski determine its ability to keep from slipping sideways in a carving turn. Since the ski is actually "scraping" the snow in the turn, one which resists deflection in torsion and laterally will provide a "scraper" with more pressure and a steeper angle to the sliding surface, especially on very hard, icy surfaces.

3. **Mass** and its distribution determines the ease with which the ski can be rotated about its y axis. A ski which is more easily rotated will tend to be quicker than one which is more difficult to rotate but is otherwise identical. A ski which is too massive and/or has its mass distributed too much to the ends will feel sluggish in coming out of a carved turn in addition to being cumbersome to carry around. A ski which is too light will feel insecure at high speed, since it will be too easily deflected sideways and vertically; it will not have the mass necessary to develop the momentum needed for a smooth ride.

"Bucky" Kashiwa is a product design engineer at K2 Corporation, Vashon Island, Washington, with impeccable skiing credentials. He is a former senior A ski racer, and his brother Hank, a member of the U.S. Olympic team in 1972, is currently a professional ski racer. Bucky entered WPI in September 1970 and graduated under the WPI Plan in March 1973. His major qualifying project was a study of drag in skiing and his interactive project involved a study of creativity. He is a native of Old Forge, New York.

The three variables of width, stiffness, and mass and their distribution are all interrelated in determining the performance of the ski. Imbalances in stiffness can be compensated for by changes in width; imbalances in width can be changed by stiffness, or camber changes; and either or both can cause discrepancies in performance which can, in some cases, be corrected by changes in mass distribution. This is the reason there are many differently shaped skis on the market, all differing in mass, stiffness, and width but which ski in a manner comparable to one another.

4. **Dampness**, the internal energy absorbing capacity of the ski, determines in part the comfort of the ski's ride. A very damp ski will be more comfortable to ride on very hard snow and ice than a ski which has very low internal energy absorbing capacity.

Making Measurements Meaningful

These four major variables, together with related variables such as stiffness in three dimensions and camber, make a total of about nine factors that contribute to the ride and handling qualities of the ski,* and the ski engineer must find ways to sort out and define the variables in the laboratory. Before any meaningful correlation between laboratory and on-slope performance data can be made, the laboratory data must be collected in a manner most representative of the actual nature of the ski. The engineering in ski design takes place both in determining the laboratory description of ski, and in learning qualitatively the degree to which each individual change in variable affects the performance of the ski. The effects of various changes in the ski on its behavior is something learned only through experience; from continuously collecting bits of data both subjectively and through controlled testing. The optimum method of describing the ski is also something learned only through experience, through trial and error of various methods to find which ways are most representative of the true nature and show the actual differences between skis; it is aided greatly, however, by a basic understanding of the sciences and their application in engineering. Mechanics, dynamics, beam deflection theory, and control system analysis are all necessary, in their basic theory, for the most complete description possible of a ski and are therefore prerequisites for the analytical design of skis.

**One factor which has a great influence on the performance of the ski is the binding placement; although it is not a specific design criterion, it must be considered in evaluating the ski on the slope. A binding placement change of only about 4 mm can change the turning characteristics of some skis, while it is less perceptible on skis of differing stiffness, width, and weight distributions.*

Snow and Ice

Can you identify these WPI buildings - - or parts of buildings - - in their winter uniform of snow and ice?

Answers on page 17

1

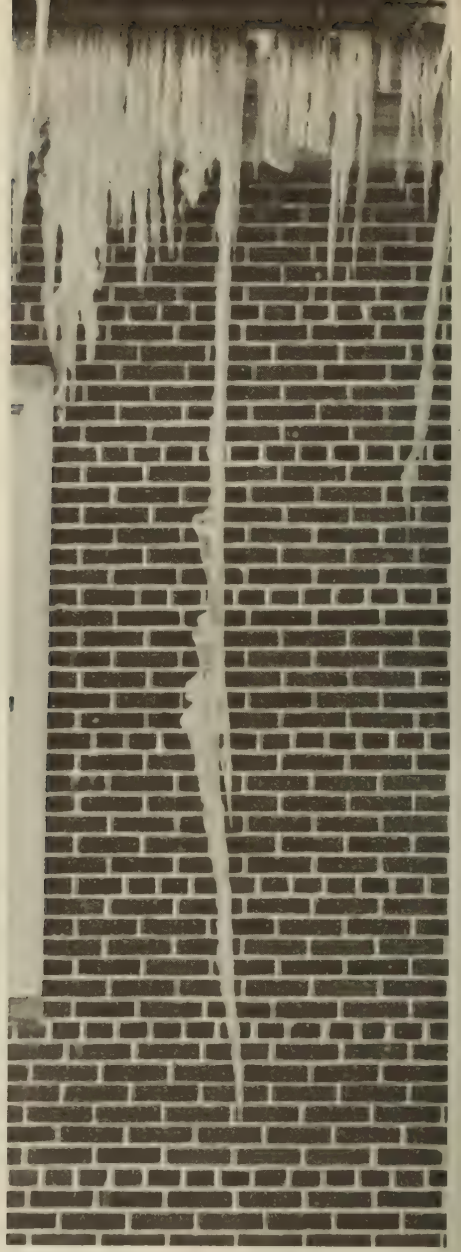
2

3

photographs by Russell Kay

14

4

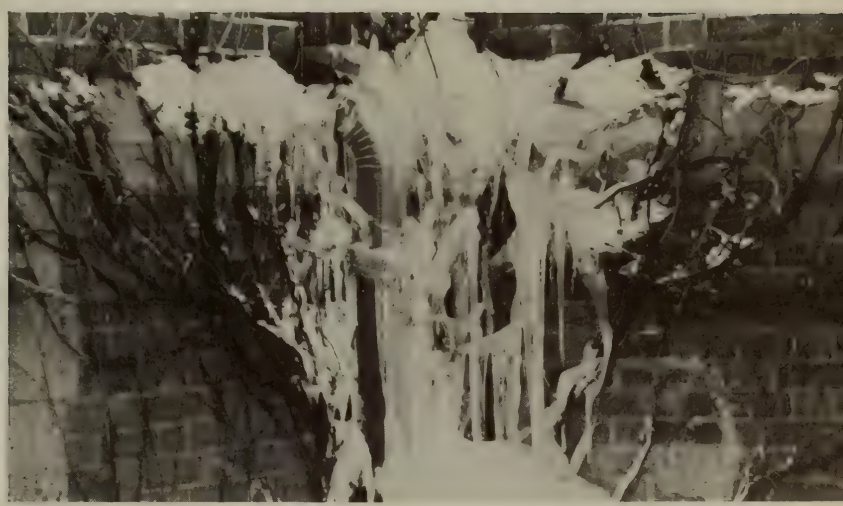


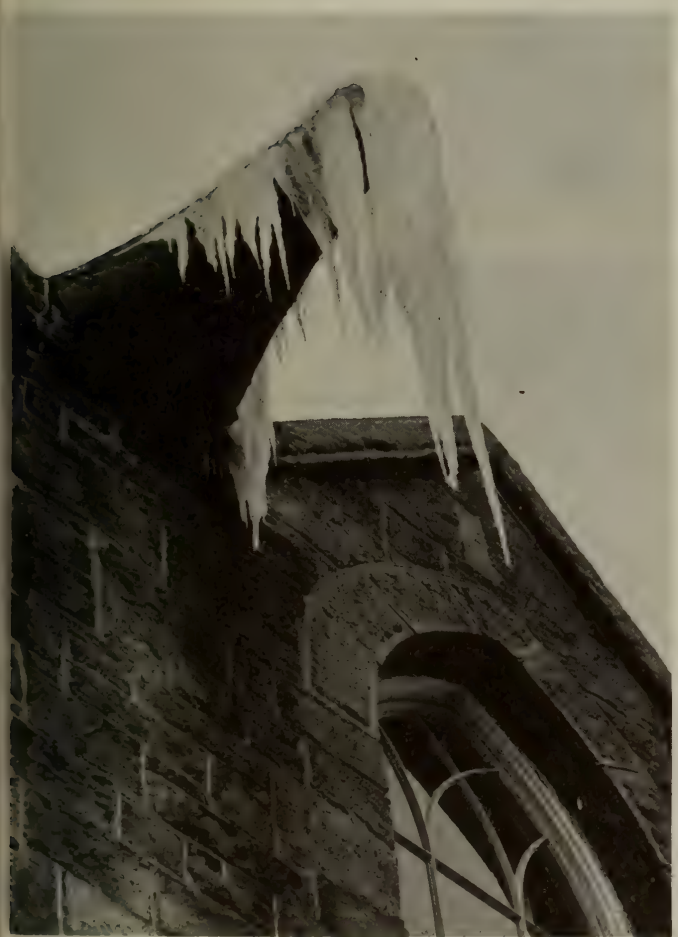
6

5

7

8





9

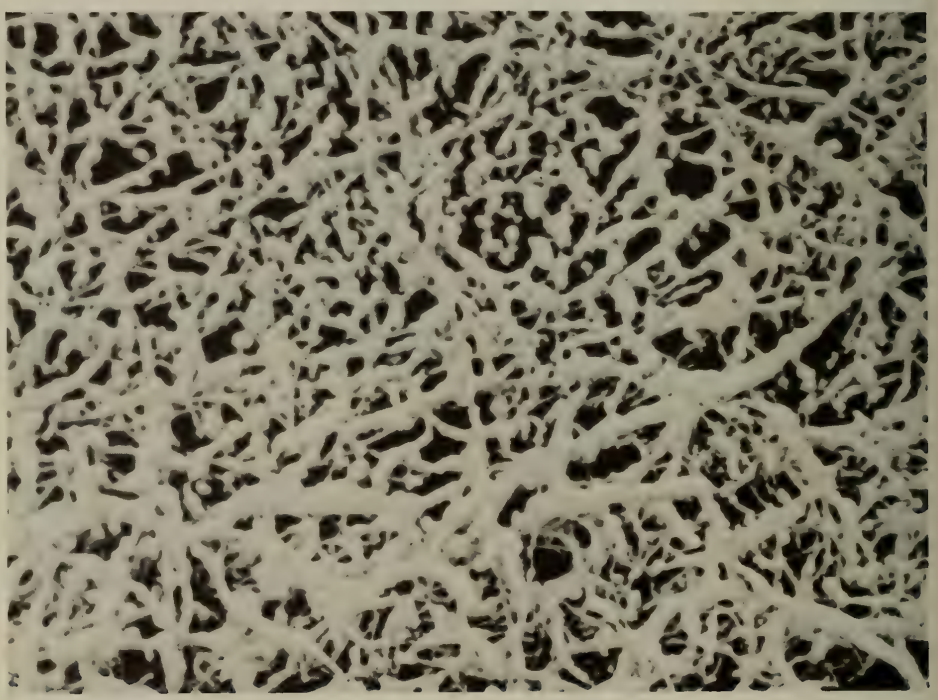
10

11

17

Answers

1. Gordon Library – the entrance to the Computer Center.
2. What else but the icicles that grow from Boynton Hall's gothic gutters.
3. Salisbury Laboratories, with the ivy magically transformed into a spiderweb tracery of snow. Alas, the sight only lasted a couple of hours until the sun emerged.
4. A tiny cornice of ice on a concrete post in front of Kaven Hall.
5. Washburn
6. A strange and long icicle that grew from Olin Hall of Physics.
7. Earle Bridge and Boynton Hall.
8. A leaky gutter downspout at Sanford Riley.
9. One of the Boynton bombs – ready to fall.
10. Ice detail on a pier at the side of Atwater Kent.
11. Ice formation by the entrance to Boynton Hall.
12. The tracery on Salisbury, close-up. Recognize the original of the cover picture?
13. Perhaps the longest icicle in the history of Worcester, this one draped a corner of Boynton Hall near the front entrance for a few days in January.



12

13

Your Class and Others

The data on which these class notes are based had all been received by the Alumni Association before January 1, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI Journal.

1910

The GEORGE MARTINS celebrated their 60th wedding anniversary last November 4th at a special mass offered in their honor at St. Edward the Confessor Church in Westminster, Mass.

1913

WILLIAM R. STULTS writes that he is now residing with his son at White Oak, Apt. 3A, 4156 Napier Ave., Macon, Georgia.

1922

Married: ROBERT B. HALL and Effie A. Reed on November 6, 1973 in Sanbornton, New Hampshire.

1923

RICHARD H. SHAW has retired from Allendale Mutual Insurance Co., Johnston, R.I., and is now living in Clearwater, Florida. . . . RICHARD WALBERG was recently elected chairman of the board at San Francisco Federal Savings & Loan Association. He is also chairman of the board of Swinerton & Walberg Company, a prominent construction firm which operates throughout the United States.

1926

WARREN T. WENTWORTH, who retired from General Electric Co. several years ago, is teaching mathematics, drafting, and machine design at Northeast Institute of Industrial Technology in Boston. . . . ROBERT O. WRIGHT serves as treasurer of the Indoor Gardener Publishing Company, Knoxville, Tenn. Previously he was with Valley Materials Handling, Inc., Knoxville.

1927

Last June CHARLES H. FOGG retired as chief, Hydroelectric Design Branch, U.S. Army Corps of Engineers, Dallas, Texas.

1929

LAURENCE F. CLEVELAND recently retired as a professor of electrical engineering at Northeastern University, Boston, where he has been named Professor Emeritus. He plans on traveling during his retirement. . . . The ARTHUR W. KNIGHTS have been entertaining a number of WPI alumni lately including the RICHARD A. BETHS, '27; HOLBROOK L. HORTONS, '29; and FREDERICK G. BALDWINS, '29. They write: "While we are at it—congratulations on the new JOURNAL. It even elicits praise from our Cornell son-in-law!"

1930

CARL W. BACKSTROM retired last summer as division manager of the Worcester Wire Division of National Standard Co. Currently he is executive committee member-at-large and chairman of the Citations Committee for the Alumni Association. . . . GEORGE A. MARSTON has now fully retired from his duties as a professor of mechanical engineering at Western New England College, Springfield, Mass. Previously he was dean of engineering at the University of Massachusetts.

1931

EDWARD J. BAYON has been awarded the Arthur Sydney Bedell Award by the New England Water Pollution Control Association of which he is a member. The award is presented annually to an individual who has given performance and expertise in the field of water pollution control projects. Bayon is a partner in the engineering firm of Tighe & Bond, Holyoke, Mass. . . . GUSTAV E. MANGSEN is a retiree. Formerly he was a research engineer at Greenlee Diamond Tool Co., Des Plaines, Ill. He now resides in Shrewsbury, Mass.

1932

EDWIN S. BROWN of Pawcatuck, Conn. recently concluded a 13-year career in the engineering department of the Davis-Standard Division of Crompton & Knowles. In September he was honored at a retirement party at the Pond View Country Club, where he was presented gifts by the company vice president. Brown is a past commodore of the Westerly (R.I.)Yacht Club, a past commander of the Westerly unit of the U.S. Power Squadron, and a member of the U.S. Coast Guard Reserves. Prior to joining Davis-Standard he was employed by Electric Boat and Bostitch, Inc.

1933

WILLIAM A. ANDERSON, Manchester Division electrical engineer for Public Service Company of New Hampshire, retired in October after more than 39 years of continuous service with the utility. He joined the General Engineering Department in Manchester in 1934. After serving in the Navy in World War II, he was transferred to Laconia as division electrical engineer, a position he held until 1963 when he returned to Manchester. Anderson is a registered professional engineer in New Hampshire, a member of IEEE, the New Hampshire Society of Professional Engineers, and the National Society of Professional Engineers.

ARTHUR E. SMITH, chairman of the board of United Aircraft Corp., East Hartford, Conn., is retiring January 1, 1974. He joined the company as an experimental test engineer with the Pratt & Whitney Aircraft Division in 1935. He was elected president of Pratt & Whitney Aircraft in 1967 and in January 1968 moved into senior corporate management as executive vice president. In October 1968 he was elected president of United Aircraft and four years later became chairman of the corporation. He will continue as a director and executive committee member following his retirement.

He is a director of the Connecticut Bank and Trust Company, the Savings Bank of Manchester, and the Manchester Memorial Hospital. In 1969 he was awarded an honorary degree of doctor of engineering by WPI. A former vice president of the Hartford Chapter of the Alumni Association, he also received the Robert H. Goddard Award from the Association in 1967.

1934

Presently J. BOYLSTON CAMPBELL is an editor at Pacer Systems, Inc., Fort Washington, Pa.

1935

MARK ABELSON is a staff assistant to the secretary at the U.S. Department of the Interior, San Francisco, Calif. . . . PRESTON H. HADLEY, Jr., is vice president of Gibbs & Cox, Inc., Hyattsville, Md. . . . JOSEPH A. JOHNSON, former program manager at Naval Ships Systems Command, Washington, D.C., has retired. . . . Also retired is DOUGLAS L. WATKINS, who was chief cable engineer at U.S. Steel Corp., Worcester.

1936

GEORGE L. CHASE serves as executive vice president at Ball and Socket Mfg. Co., Cheshire, Conn. . . . HAROLD F. HENRICKSON writes that he is actively retired on his farm in Holden, Mass., and cottage in Vermont, where he hunts. He also has been playing golf and fishing in New Brunswick, Me., and the Cape. Formerly he was with Pratt & Whitney Aircraft, North Haven, Conn. . . . JOHN J. O'DONNELL works as a sales representative for Underground Products, Livonia, Michigan.

1937

STANLEY HYMAN is vice president of research and development and engineering for Safety First Products Corp., Elmsford, N.Y. . . . A. HALLIER JOHNSON, now retired, is still located in Chesapeake City, Md. Previously he was a project engineer at E. I. duPont deNemours & Co., Wilmington, Delaware.

1938

ALBERT J. KULLAS holds the position of director-project management and technology at Martin Marietta Data Systems, Towson, Maryland. . . . Recently FRANCIS WITKEGE and his wife, Lorraine, visited RICHARD CLOUES and his wife in California during a nation-wide tour with their 24-foot trailer. The Witkeges gave their hosts a first-hand account of the 35th class reunion held last summer at WPI.

1942

ROY F. BOURGAULT, professor of mechanical engineering at WPI, has been elected to the Mohegan Council (Boy Scouts of America) board of directors in Worcester. . . . The School Committee of North Reading, Mass., has unanimously chosen RALPH G. FRITCH as the business affairs administrator for the town school system. His new title is Administrative Assistant to the Superintendent of Schools for Business Affairs. For 24 years he worked for the Boston and Maine Railroad. In 1963 he resigned to run his own business, Hawkes Grinding and Tool Corp., where he served as president until 1969. After selling his business he spent three years as Director of Exhibit Production at the Boston Museum of Science. . . . WILLIAM S. JACKSON, Jr. is currently regional sales manager at E. I. duPont deNemours & Co., in Houston, Texas.

1944

ROBERT E. FAY works as a research and development manager for E. I. duPont deNemours & Co., Wilmington, Delaware. . . . WILLIAM E. POWERS, Jr. is engineering manager at Polaroid Corp., Norwood, Mass.

1945

JOHN B. McMASTER works for Chevron Oil Co., Perth Amboy, N.J. . . . RICHARD T. WALSH has been employed by Insilco Corporation, Meriden, Conn.

1946

RODNEY S. CHASE serves as manager of James H. Rhodes & Co., Long Island City, N.Y. . . . HAROLD L. SCHIMMACK is now a management consultant at the Department of Health, Education and Welfare, Atlanta, Ga. . . . FONG Z. YIH holds the post of purchasing manager for Kayser-Roth International Ltd., in Hong Kong.

1947

LEO W. GEARY is a project engineer for the U.S. Navy at the Navy Yard in Washington, D.C. . . . PAUL D. O'DONNELL, general manager of the Westinghouse Specialty Metals Division at Blairsville, Pa., was listed in the 1973 edition of *WHO'S WHO*. . . . KENNETH H. TRUESDELL was recently named manager of Systems Installation and Service at Turbo Power & Marine Systems, a subsidiary of the United Aircraft Corporation, in Farmington, Conn. Since 1969 he

---

Nixon to Name WPIer New Patent Chief

President Nixon announced in December his intention to nominate C. MARSHALL DANN, '35, as Commissioner of Patents. The appointment is subject to Senate approval.

Mr. Dann, who has been serving as chief patent counsel for Du Pont Co., will be taking office as the third patent chief since the start of the Nixon administration. He succeeds Robert Gottschalk whose resignation was effective last June.

A special panel headed by Dr. Ancker-Johnson screened prospective candidates for the patent post. Mr. Dann's qualifications appear to have met the panel's criteria. He is the immediate past president of the American Patent Law Association and a former president of the Philadelphia Patent Law Association. At 58 years of age he oversees the work of 90 patent attorneys in Du Pont's patent division. Associates describe him as a skilled yet not flamboyant administrator with an excellent analytical mind. His approach is "cool, almost clinical" they say.

When asked why he wants to leave Du Pont after 38 years of service, he replied that he had been sitting in the same building doing the same thing for too long. He looks on his first government post as a challenging one.

Mr. Dann is no stranger to Washington. He received his bachelor of laws degree from Georgetown University in 1949. After receiving his BS in chemistry from WPI in 1935, he earned his MS from the University of Delaware in 1942.

As patent chief it is expected that he will play a pivotal role in resolving the rigorous opposition to reform measures now before Congress. He will also have to tackle such administrative matters as resolving the problems of the quota system for counting the work of patent examiners and moving ahead with measures to speed processing of patent applications.

had been manager of Product Support. He joined the firm in 1965. Turbo Power & Marine Systems designs, sells, installs and services a variety of gas turbine-powered electric generating stations for utility companies throughout the world.

1948

Currently W. J. WACHTER is engineering manager at Boeing Aerospace in Kent, Washington. . . . OTTO KERN has been named an associate director in the Building Services Department of Massachusetts Mutual Life Insurance Co. He joined the company in 1953 and was promoted to building engineer in 1971.

1949

RENE H. BACHAND was recently awarded the position of registered school business administrator in the Longmeadow (Mass.) public schools. The award is the highest professional status that can be attained by a practicing school business official and is granted by the Association of School Business Officials of the United States and Canada, an organization of which he is a member. Only 10 per cent of the active national membership have earned the award. Bachand is director of business services in the Longmeadow public schools, which he joined as the system's first business manager in 1960. He was promoted to his present position in 1966. . . . EDMUND B. BAKON, principal of the Chenery Middle School in Belmont, Mass., has been elected by the School Committee to the position of Assistant Superintendent for Curriculum and Instruction. He has served as principal at Chenery since 1968, when the then Junior High School was converted to a Middle School, a transition which was carried out under his leadership. Bakon won his new administrative position out of a field of 115 applicants. . . . ALFRED HAPGOOD, Jr. has joined Webster (Mass.) Lens Company as director of manufacturing. Previously he had served many years in various executive lens manufacturing capacities at American Optical Corporation, Southbridge, Mass. . . . JOHN D. SAUNIER is a professional employment counselor at Snelling & Snelling Personnel, Edison, N.J.

JAMES S. ADAMS has been appointed vice president of marketing for General Instrument's Electronic Systems Division (ESD) in Hicksville, N.Y., with additional responsibility for all marketing activities of the corporation's Commercial Data Systems (CDS) Division. Adams, who held the post of director of marketing at ESD since 1968, previously was the director of systems marketing for Sperry Gyroscope Division of Sperry Rand. Earlier, he was associated with AT & T. The ESD Division of General Instrument specializes in electronic systems for military and defense applications. The CDS Division supplies mini-computer based data handling systems for business installations.

Truesdell, '47

Adams, '49

1950

Currently Col. FRANK W. HARDING III, (USAF), serves as Director of Procurement at Rome (N.Y.) Air Development Center. . . . CHARLES O. PARNAGIAN has been appointed manager of the New York District Sales Office for Joy Manufacturing Company of Pittsburgh, Pa. Formerly he was with American Standard and Fairbanks Morse Co. . . . JOHN W. PEIRCE is vice president, Corporate Information Services, at the Foxboro (Mass.) Co. . . . RICHARD C. PIEPER works as a production manager for Lear Avia Corp., Reno, Nevada. . . . LESTER J. REYNOLDS, Jr. is presently product manager-textile chemicals at American Cyanamid Co., Bound Brook, N.J.

1951

MARK E. BAKER, a project engineer at Hamilton Standard, is presently assigned as engineering representative at the company's western region office in Los Angeles, Calif. . . . JOHN MARLEY was honored by Motorola, Inc. for a patent granted jointly to him and the company for a system design for a vehicular antiskid device. He is senior engineer for the Motorola Semiconductor Products Division. His citation included a cash award and membership in the firm's prestigious Scientific and Technological Society. . . . CONSTANTINO K. MUSTAKIS works for Gerente de Gianoli Mustakis in Santiago, Chile. . . . DONALD F. STOCKWELL is now D & E operations administrator at the Foxboro Co., Foxboro, Mass. . . . PAUL E. THOMAS serves as manager-new business development at E. I. duPont deNemours, Wilmington, Delaware.

1952

BRUCE S. CAMPBELL is assistant superintendent of construction for Stone & Webster in Westlake, Louisiana. . . . ALLAN R. THAYER holds the post of principal engineer at Raytheon Co., Sudbury, Mass.

1954

RICHARD C. LONG, SIM, has been elected assistant treasurer at Commerce Bank & Trust Co., Worcester. He is administrator of the bank's Master Charge Department. . . . WESLEY D. WHEELER was recently appointed technical director of American Bulk Carriers, Inc., New York City. Previously he was technical counselor to the Bay of Cadiz new shipyard group (NABAC) of Astilleros Espanoles, S.A. While in Spain, he presented a paper, "Shipping—How Goes It?", to the Asociacion de Ingenieros Navales of Madrid, of which he is a member.

1955

Born: to Mr. and Mrs. ROBERT H. PEARCE a son, John Robert, on November 22, 1973. The Thanksgiving baby joins his brothers, Bill 13, Michael 10, and sister, Maureen, 6. Bob is still with the USE Comm. at Fort Monmouth, N.J. The Pearces have purchased a new summer home at Goose Rocks Beach, Kennebunkport, Me., where some day "we hope to retire."

RICHARD L. GOLDMAN is a product manager at Microwave Associates, Burlington, Mass. . . . Presently BRIAN J. KELLY works for Bell Telephone Co. in Monroeville, Pa.

1956

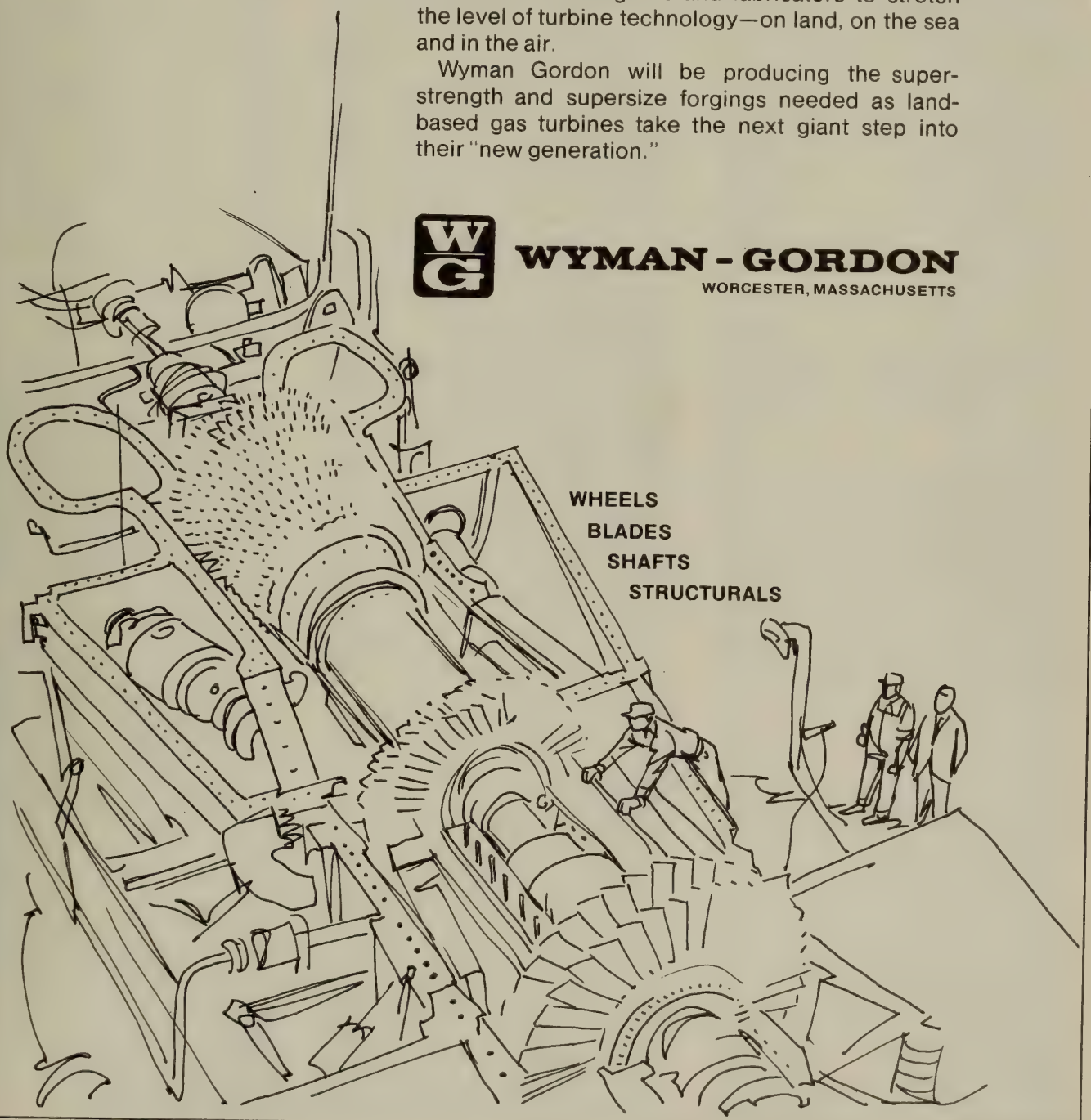
ROBERT S. ALLEN serves as vice president of World Wide Construction Services, Inc., Wichita, Kansas. . . . ALBERT D. BATTISTA, one of the founders and part-owners of Laser, Inc., Sturbridge, Mass., has been named president of the new company. His firm purchased the commercial solid state laser and accessory business from American Optical Corp. last July. Earlier Battista was manager of engineering at American Optical Corp., Southbridge, Mass. He holds several patents on laser products and is a member of the Laser Institute of America. . . . NORMAN B. FISCHER was recently appointed director of engineering at Yale-New Haven Medical Center, New Haven, Conn. He also serves as Newsletter editor for the New England Hospital Engineers Society and as public relations representative for the Connecticut Hospital Engineers Society. He writes that one of his highest priorities is the effective implementation of clinical engineering within the hospital setting. He still maintains his engineering consultant business in Madison, Conn. . . . ROBERT H. PHILHOWER is a computer applications specialist for DuPont, Wilmington, Delaware. . . . ANTHONY V. SCANCELLA works as technical superintendent at E. I. duPont deNemours & Co., Fairfield, Conn.

Forging for the new generation of turbine engines

Wyman Gordon's mechanical/metallurgical skills have allowed designers and fabricators to stretch the level of turbine technology—on land, on the sea and in the air.

Wyman Gordon will be producing the super-strength and supersize forgings needed as land-based gas turbines take the next giant step into their "new generation."

WG **WYMAN-GORDON**
WORCESTER, MASSACHUSETTS



Where Are You?

The Alumni Association tries to keep track of all WPI alumni, but 10,600 people make for a lot of moving around, and we don't always hear about it, and that means that a sizable number of alumni aren't getting the Journal *or* Newsbriefs. *Last April we ran a list of some of the people for whom we didn't have addresses, and this issue completes the listing. Please help us if you know the current whereabouts of any of these alumni.*

Philip L. Barbaccia	1950
Fred A. Carmody	1950
Frank J. DeMarco, Jr.	1950
Gerald Fleit	1950
Morey L. Hodgman	1950
Robert L. Tagen	1950
George M. Cooley	1951
Ellsworth R. Cramer	1951
Leon Hoogasian	1951
Mehmet R. Ozbas	1951
Ratanshaw K. Patel	1951
Mustafa T. Sonmez	1951
Dick van den Berge	1951
David F. Wright	1951
John D. Writer	1951
Bernard G. Ziobrowski	1951
Jack Y. T. Kwan	1952
Edmund M. Luzgauskas	1952
Lysle P. Parlett	1952
Bernard J. Petrillo	1952
Richard G. Schmitt	1952
Stanley C. Andrukonis	1953
Thomas J. Bagley	1953
Karl H. Bissell, Jr.	1953
Martin R. Cohen	1953
Ernest E. Demar	1953
Nasuh M. Malas	1953
Hugh R. McLaughlin	1953
David C. Morrison	1953
Paul C. Murray	1953
Harold G. Rackett	1953
Philip R. Randall	1953
Dr. Wu Mei Yao	1953
Framrose M. Karani	1954
James F. King	1954
Haralambos N. Kritikos	1954
Harold Lake	1954
Jack K. Mackowiak	1954
William J. Mahota, Jr.	1954
Robert S. Nahas	1954
Raymond M. H. Naudin	1954
David P. Nygard	1954
James E. Clampett	1955
Markar A. D. Markarian	1955
Richard C. Oldham	1955
Antonio Aranguren	1956
Paul A. Cnossen	1956
Edwin J. Leonard	1956
Juozas Orentas	1956
Herbert P. Schoeck, Jr.	1956
Benjamin J. Thurlow, Jr.	1956
Thomas E. Weber	1956
Santo M. Bramande	1957
James F. Fournier	1957
Thordur Grondal	1957
Augusto Ramirez Barrera	1957
Michael Spiegel	1957
Benjamin G. Uy	1957
Roger R. Billings	1958
John F. Daly	1958
Frank K. Lind	1958
Richard E. Lorenz	1958
Nicholas S. Petralias	1958
Dr. Sherman K. Poultney	1958
Frank A. Seidel	1958
John A. Beede	1959
Alan E. Benson	1959
Roberto Jaramillo, Jr.	1959
James W. Mahoney	1959
Davis C. McLeod	1959
Robert W. Milik, Jr.	1959
Harvey J. Rosenfeld	1959
Joshua C. Alpern	1960
Henry W. Brandt	1960
Arthur D. Brook	1960
Dr. Douglas E. Bryant	1960
William M. Cannon	1960
Gungor Dagistanli	1960
Capt. Joseph S. Kaye	1960
Edward D. McGrath	1960
Kenneth Roberts	1960
Peter H. Schneider	1960
Maung T. Swe	1960
Derin K. Turkomer	1960
Ara Tutunjian	1960
Lt. J. Warren Alford	1961
George R. Bolduc	1961
Kayhan Bord	1961
Eduardo Cruz	1961
Terry W. Donovan	1961
James R. Duca	1961
Suat Gonen	1961
James Kachadorian	1961
John W. Kappel	1961
Swang Lee-Aphon	1961
Richard A. Levendusky	1961
Russell C. Lockwood, Jr.	1961
Thomas P. Lopresti	1961
George Matassov	1961
Maung T. Maung	1961
Dr. Timothy C. Meyers, Jr.	1961
Gordon B. Phillips	1961
Husein Y. Pothiawala	1961
Donald E. Schaaf	1961
Frank E. Thomas	1961
Donald W. Wilmot	1961
Maung N. Win	1961
Haines J. Boyle	1962
Robert D. Britton	1962
Mehmet I. Can	1962
Victor B. Castellani	1962
Louis C. S. Fernandes	1962
Stuart C. Gillow	1962
Francis J. B. Goddu	1962
Ralph H. Griswold	1962
Captain Jackie P. Matteus	1962
Robert G. McDonald	1962
William H. C. Reinert	1962
Albert M. Rockwell, Jr.	1962
Basat H. Tilkicioglu	1962
Walter M. Adams	1963
Paul Y. Chan	1963
Thomas W. Greisamer	1963
Capt. Herbert W. Head	1963
William P. Morrison	1963
Pundalik U. Prabhu	1963
Gordon O. Stearns	1963
Kendal B. Turner	1963
Harold H. Wright	1963
Stanley J. Andrysiak	1964
Bernard Baron	1964
Krishnakumar V. Chaudhary	1964
Alan K. Cooper	1964
Richard A. Downe	1964
George E. Hammond	1964
Peter C. Trombi	1964
Paul A. Vajcovec	1964
John T. Apostolos	1965
Arthur M. Dickey	1965
James P. Molloy	1965
Venkatesh B. N. Rao	1965
Ali H. Ustay	1965
Dilip V. Vora	1965
Robert G. Bertrand	1966
Satish H. Bhatt	1966
David M. Burwen	1966
Omer M. Cavusoglu	1966
Shailesh V. Dave	1966
Sharad B. Doshi	1966
Roberto Huyke-Luigi	1966
Ahmet G. Kozanoglu	1966
Gerald W. Lucas	1966
Ahmet Mavitan	1966
Edgar P. Rundlett, Jr.	1966
David E. Spencer	1966
Subhashchandra N. Amin	1967
James R. Braithwaite	1967
Athanassios H. Canatsoulis	1967
Fernando Castillo	1967
Mahendra K. Dave	1967
Rein C. Freeberg	1967
Philip R. Gaudet, Jr.	1967
Ronald S. Gosk	1967
Richard C. Graham	1967
John P. Keir	1967
Mitchell P. Koziol	1967
Leonard J. Lamberti	1967
Alan E. Larson	1967
Mohmedjarid M. Malek	1967
David R. Malley	1967
Denis F. McQuillen	1967
Ajit M. Mody	1967
Rajendra M. Pandya	1967
Mafatbhai N. Patel	1967
George W. Pomfret	1967
Richard A. Shaw	1967
Vishram S. Shinde	1967
Alan D. Wentworth	1967
Frederick J. Eckert	1968
Robert J. Ellis	1968
Thomas E. Fitzpatrick	1968
John Richard Hilyard	1968
John D. Hoyt	1968
Gerald G. Junevicus	1968
Sudhir M. Mody	1968
Hareesh S. Shah	1968
Malay C. Sheth	1968
Donald R. Shurtleff	1968
Jas. P. Singh	1968
Robert L. Smith	1968
Robert J. Strople	1968
Warren Lloyd Anderson	1969
Raj K. Chauhan	1969
Dr. William G. Clark	1969
Steven H. Leece	1969
Robert J. Magarian	1969
James H. Morse	1969
Harivadan R. Parikh	1969
Harshad K. Patel	1969
Rambhai J. Patel	1969
Alfred F. Perrone, Jr.	1969
James L. Richey, Jr.	1969
Ronald P. Rosadini	1969
Mohammad Vakilian	1969
David M. Alden	1970
Muammer Arikan	1970
David B. Armitage	1970
John F. Campanella	1970
Demetrios H. Canatsoulis	1970
Michael J. Demoga	1970
William A. Ferranti	1970
Jagdish C. Gupta	1970
Andrew Ann-Shong Huang	1970
Raymond J. Janus	1970
Stephen J. Joyce	1970
Steven A. Lacaire	1970

Praful V. Palan	1970
Rameshchandra N. Patel	1970
Arnon Rieger	1970
Harkant J. Shah	1970
Krishna S. Tahilani	1970
Stephen J. Barlow	1971
Jeoffrey N. Berg	1971
Dr. Sharadchandra M. Dave	1971
Joseph A. Dumais	1971
Robert P. Hart	1971
Chul Kim	1971
Joseph C. Landwehr	1971
Bruce E. Leffingwell	1971
Richard F. Lukas	1971
William P. Mulloy	1971
John G. Parillo	1971
Mahendrakumar K. Patel	1971
Donald B. Seaton	1971
Paul R. Smith	1971
Lawrence J. Sniegoski	1971
Francis Soares	1971
Martin H. Wolf	1971
Gary Lee Dunkleberger	1972
Chandrakant H. Kansagra	1972
Paul Kelley	1972
Sudhir P. Patel	1972
Sureshchandra N. Patel	1972
Bertrand A. Pinel-Darrieux	1972
Alain Roux	1972
Joyce L. Caplovich	1973
Mon-Her Chen	1973
Vinod K. Sharma	1973
Sammy G. Shina	1973
Manubhai G. Thakkar	1973
Francis W. Yanuskiewicz	1973

Dr. Cohen's Slime Molds

Dr. MORREL H. COHEN, '47, Louis Block Professor of Physics and Theoretical Biology at the University of Chicago, is working with a slime mold called *Dictyostelium discoideum,* whose way of life may help scientists discover secrets of cell differentiation in all life forms.

The cycle of this fascinating mold begins when a spore lands in a suitable warm, moist place. After the case softens, a speck of living tissue emerges and enlarges into an amoeba (a single, mobile, unwalled living cell), which immediately starts engulfing nearby bacteria. The tiny amoebae divide into identical daughter cells which keep on dividing until all the available bacteria are devoured, a process which takes about eight hours.

At the onset of starvation, certain key members of the group begin to signal by releasing a few molecules of a chemical called cyclic adenosine monophosphate (cAMP) from their surfaces. When the cAMP reaches neighboring cells, two things happen. The neighbors repeat the signal and in about 15 seconds they start to move toward the original source in a jerky fashion. Initially the cell can do this only once in six minutes, but later is able to repeat the process every two minutes.

Dr. Cohen's time-lapse movies, made through microscopes, show how the cells stream inward in swirling droves toward the source. Eventually the spiral "differentiates" —it grows into a mound with a visible tip, which becomes the control center of the mass of cells. A coating of slime forms on the mound and hardens.

As the mound starts to grow upward, the tip rises and the whole thing topples over and crawls. The creature by this time could contain 100,000 cells. It is visible to the naked eye and looks almost like a slug. As it migrates toward more favorable living conditions, the tip looks much like a flower stem, and forms into a blossom-like ball of spores setting the whole life cycle in motion again.

Dr. Cohen's particular forte is applying wave pattern equations derived in physics to this biological phenomenon. Other researchers believe their time-lapse photographs of chick embryos show similar wave action at the time of differentiation. Perhaps a parallel can be found in the diffusion of chemicals through unstirred liquids and the spread of signal from cell to cell which will help us to understand the processes required in forming a human being from a microscopic fertilized egg.

1957

Dr. CHARLES A. TYSON is project associate at the Institute for Enzyme Research, Madison, Wis. . . . D. CARL WEBSTER now serves as the director of program management at Army Tactical Data Systems (ARTADS), Fort Monmouth, N.J. Formerly he had been with the U.S. Army Satellite Communications Agency at the same facility.

1958

WILLIAM J. O'NEIL was recently appointed service manager-automation, New Jersey and Atlantic Districts, for General Electric's Installation and Service Engineering Department. He joined G.E. as a sales engineer in West Lynn, Mass. In 1966 he transferred to the Electric Utility Automation Sales Operation in Schenectady, N.Y., as a sales application engineer. By 1969 he had become an automation sales engineer in the Power Generation Sales Division in New York City. . . . NORMAN J. TAUPEKA, after having accepted a new position as electronics engineer with the project manager, Army Tactical Data Systems (ARTADS) in 1971, has since been awarded the Outstanding Performance Rating for two consecutive years. He has been instrumental in furthering the Army's goal of automating the Field Artillery through the development of the Tactical Fire Direction System. Previously he had been with the Communications/Automatic Data Processing Laboratory in Fort Monmouth, N.J. His present location with ARTADS is also Fort Monmouth.

1959

Born: To Mr. and Mrs. PETER A. NELSON a son, Craig Stephen, on October 14, 1973. Craig has a brother, Scott, who is three. Pete is a senior test engineer at the Westinghouse Electro-Mechanical Division at Cheswick, Pa. He is responsible for the testing of commercial and naval nuclear canned-motor coolant pumps and control rod drive mechanisms. He has passed his professional engineer registration exam in Pennsylvania and is already registered in Massachusetts. A member of the Pittsburgh chapter of PSPE, he also serves as treasurer of the Westmoreland section of ASME.

ROBERT G. CHADWICK has been named manufacturing manager at Torrington Company's proposed new plant in Sylvania, Georgia. He joined Torrington (Conn.) Co. in 1961 as a project engineer in the bearings division. Soon after he attained the level of superintendent in local bearings production. . . . P. D. EDWARDS holds the post of plant manager at American-Standard, Piscataway, N.J. . . . EDWARD F. McKEON works for Farm Bureau Insurance Co., Lansing, Mich. . . . ROGER E. MILLER is studying to be an Episcopal priest at Seabury-Western Theological Seminary in Evanston, Ill. . . . JOSEPH B. VIVONA serves as an administrative assistant for Fulton County in Atlanta, Georgia. He received an advanced degree from Georgia State last year.

1960

DWIGHT M. CORNELL, an engineering supervisor for Bechtel Power Corp., is temporarily on special assignment in Waterford, Conn. . . . DAVID A. JOHNSON serves as a customer relations specialist in the Graphics Markets Division at Eastman Kodak, Rochester, N.Y. . . . NATHANIEL M. JOHNSON is employed by Tilton Electronics Corp., Winnisquam, N.H., as plant manager. . . . STEPHEN LEVY, chairman of the Ocean Township Environmental Commission, has been reelected president of the statewide Association of New Jersey Environmental Commissions. . . . WARREN T. MUNROE is project engineer at Datametrics, Inc., Wilmington, Mass. . . . BERNARD J. SEASTROM works for GTE Sylvania, Inc., Need-

ham, Mass. . . . Dr. CHARLES A. STEVENS is assistant professor of industrial engineering at Virginia Polytechnic Institute, Blacksburg, Va. . . . GEORGE G. WILSON holds the position of engineering manager for GTE Sylvania, Needham, Mass. . . . Dr. THOMAS F. ZIMMIE is an assistant professor at RPI, School of Engineering, Troy, N.Y.

1961

PETER D. BEEKMAN now serves as marketing representative at Itel Corp., New York City. . . . WAYNE F. GALUSHA is manager of peripheral products at Data General, Southboro, Mass. . . . G. LEONARD JOHNSON has been appointed nuclear projects engineer at Northeast Utilities in Berlin, Conn. In 1961 he joined the Hartford Electric Light Co. (now a N.U. subsidiary), as a mechanical engineer. He transferred to Northeast in 1966 as a project engineer for the second unit of the Millstone Nuclear Power Station in Waterford. . . . ARTHUR W. KROLL in engineering manager for Edmac Associates, Inc., East Rochester, N.Y. . . . FRANK MARRA works as a product manager at Four-Phase Systems, Inc., Cupertino, Calif. . . . EUGENE R. MORSE serves as a system performance specialist for the Federal Aviation Administration in Nashua, N.H. . . . WON K. PARK is on the board of trustees at Duk Sung Foundation, Seoul, Korea. . . . Currently DAVID W. PROSSER works as an associate air pollution control engineer for Region 6 at the New York State Dept. of Environmental Conservation, Watertown, N.Y.

1962

Born: To Mr. and Mrs. WILLIAM A. BRUTSCH a son, David William, on July 12, 1973. David has a sister, Melissa, age 6. Bill is working as a senior mechanical engineer with the Metropolitan District Commission in Boston.

Maj. JAY P. HOCHSTAINE is currently stationed with the U.S. Army Logistics Command, Ft. Lee, Virginia. . . . ROBERT E. McINTOSH has been spending the past year in Holland. . . . PETER A. PARRINO serves as a senior engineer at Emerson Electric Co., St. Louis, Missouri.

1963

STUART D. BATSTONE is president-manager of Logos Bookstore, Framingham, Mass. . . . STEPHEN D. DONAHUE, Jr., who works for Procter & Gamble Co. as a materials handling specialist, currently resides in Gosforth, Newcastle-Upon-Tyne 3, England. . . . RICHARD A. GARVAIS now holds the position of production superintendent at Corning Glass Works (Electronics Products Division) in Wilmington, N.C. . . . RALPH D. GELLING is a patent attorney with United Shoe Machinery Corp., Beverly, Mass. . . . FRANCIS E. KENNEDY, Jr., who received his PhD from RPI last year, is now a post-doctoral associate at RPI, Troy, N.Y. . . . Dr. ROBERT E. MURPHY has been named the director of Maryland Academy of Sciences. He will formulate plans for the Academy's move in late 1974 into the new Maryland Science Center now under construction in Baltimore's Inner Harbor Redevelopment Area. Formerly Dr. Murphy was assistant astronomer at the University of Hawaii. Earlier he worked two years as a research assistant at Georgetown, 18 months as an astronomer for the U.S. Army Map Service, and three years as a research assistant at Case Western Reserve. He joined the staff at the University of Hawaii in 1969. . . . Maj. DAVID G. NEVERS is an instructor at the U.S. Army Engineering School and is located in Ft. Belvoir, Va. . . . PHILLIP L. PARMENTER serves as a senior application engineer at Fafnir Bearing Co., New Britain, Conn. . . . WILLIAM C. ZINNO holds the position of manager of manufacturing planning at Industrial Nucleonics Corp., Columbus, Ohio.

1964

ARTHUR R. BODWELL, now a professional engineer, is employed by Damon G. Douglas Co. (General Building Contractor) in Newark, N.J. . . . RICHARD R. BROWN was recently appointed advertising/sales promotion manager of Data General Corporation, Southboro, Mass. He will be responsible for print advertising in concert with Scali, McCabe, Sloves, Inc., New York City, for collateral materials, trade shows, exhibits, audiovisual and direct mail. He joined the firm in 1970 as a public relations specialist. . . . RICHARD G. CARLE is presently a senior engineer-software, at Raytheon Co., Bedford, Mass. . . . RALPH R. GERMANN works as a pilot for Hawaiian Airlines at Honolulu International Airport. . . . Dr. EDWARD P. IACCARINO is a research engineer for ESSO Research & Engineering Co., Corporate Research Labs., Linden, N.J. . . . U.S. Air Force Capt. ROBERT S. NAJAKA has entered the Air Force Institute of Technology (AFIT) to study toward a master's degree in civil engineering. Located at Wright-Patterson AFB, Ohio, AFIT provides resident education in scientific engineering and other fields. Capt. Najaka was commissioned in 1965 upon graduation from Officer Training School at Lackland AFB, Texas. . . . EUGENE E. NIEMI, Jr., is an assistant professor at Lowell (Mass.) Technological Institute. . . . Dr. MASON H. SOMERVILLE serves as a professor of mechanical engineering at the University of North Dakota in Grand Forks. . . . DAVID T. STONE is supervisor of oil circuit breaker development at Allis Chalmers, Jackson, Mississippi.

1965

Born: Recently to Dr. and Mrs. DAVID B. LUBER their second son, Peter Andrew. In addition to his regular job at Bell Laboratories, Luber is now teaching part time at Fairleigh Dickinson University, Teaneck, N.J.

RONALD H. CHAND is the new president of Arsee Design & Mfg., Inc., Forestville, Conn. The company manufactures sintered carbide products and other power metal products. . . . NILS E. ERICKSON is a vice president at Dufresne-Henry Engineering Corp., North Springfield, Vt. . . . DAVID W. GEIGER has been promoted to superintendent of pressed metal bearings at Torrington Co. in Connecticut. He became a bearing engineering trainee in 1965. Prior to his latest advancement he was assistant superintendent. . . . Presently DONALD G. GREGOIRE serves as development engineer-manager at IBM, Electronic Systems Center, Owego, N.Y. . . . JAMES A. KEITH is a design engineer at Raytheon in Waltham, Mass. . . . WILLIAM F. NICKERSON holds the position of R&D engineer at Philco-Ford WDL in Palo Alto, Calif. . . . PAUL R. PEARSON is employed as an analytical engineer at Hamilton Standard in Windsor Locks, Conn.

Dr. HOWARD G. SACHS serves as an assistant professor at the University of Illinois Medical School, Chicago. . . . VIJAY D. SHETH is the owner of Visco Enterprise, a firm which manufactures coin-operated equipment in Bombay, India. . . . STEVEN G. SUTKER works as a sales representative at Digital Equipment Corp., Fairfield, N.J. . . . EUGENE G. SWEENEY, Jr., is presently an area engineer at E. I. DuPont's Spruance Plant, Richmond, Va.

1966

Married: PETER GRAY IV to Miss Sandra N. Hewitt in Highland, New York on October 6, 1973. Mrs. Gray is a draftsman and her husband an engineer in the engineering department of New York Telephone Company, Poughkeepsie, N.Y. Pete, who has his MSEE from Northeastern University, was formerly employed as a development engineer at General Radio Company in Concord.

Born: To Mr. and Mrs. HEYWARD S. WILLIAMS, their first child, Hugh Parry, on September 23, 1973. Williams is presently employed as chief engineer at LRC, Inc., Hudson, N.H.

ROBERT J. COATES is with the Stanley Works, Cheraw, S.C. . . . Lt. JAMES A. COCCI has graduated from the Naval Post Graduate School in Monterey, Calif. . . . WILLIAM V. COLLENTRO has been employed by United Engineers, Inc., Boston. . . . ROBERT B. DOLAN serves as a development engineer at GTE Sylvania, Manchester, N.H. . . . RICHARD L. HEALER is a senior product development engineer at the Foxboro (Mass.) Company. . . . EDWARD E. JOHNSON works as a process engineer at Oxford Precision, West Springfield, Mass. He is also attending graduate school at Western New England.

CHARLES S. KNOTHE holds the position of supervisor of data processing at E. I. duPont deNemours, Wilmington, Delaware. . . . WILLIAM S. PETE was recently named foreman of the rear wheel bearing department at Torrington (Conn.) Co. . . . STANLEY SCHMIDT is plant engineer at Day Kimball Hospital in Danielson, Conn. . . . GERARD A. TOUPIN has been appointed

CHECK OUR SPECS BEFORE YOU BUY THEIR 4 CHANNEL RECEIVER.

	Sylvania	Pioneer	Sansui	Fisher	Harman-Kardon	Marantz
Model	RQ 3748					
Continuous (RMS) Power[1] 4 channels Stereo Bridge	50Wx4 125Wx2					
THD at rated output	<0.5%					
IM Distortion at rated output	<0.5%					
FM IHF Sensitivity	1.9μv					
50 db signal to noise ratio	2.8μv					
Capture Ratio	1.5db					
Price	$549.95[2]					

[1]All power measurements taken at 120 volts/60 cycles, 8 ohms, 20Hz-20kHz, all channels driven simultaneously.
[2]Manufacturer's suggested list price which may be higher in some areas.

If you're in the market for four channel, you already know you've got to spend a good bit of cash for a receiver. So it'd be a good idea to spend a good bit of time checking specs on everything available just to make sure you get the most for your money.

To make your search a little easier, we've prepared the blank comparison chart above with spaces for some of the best-known brands and most important specs. Just take it with you to the store, fill it in, and you'll be able to tell at a glance what you get for what you pay.

We took the liberty of filling in the Sylvania column with specs for our RQ3748 four channel receiver. We did it because we know we're not the best-known name in four channel, and we didn't want you to overlook us for that reason.

Because we think the RQ3748's specs are really worth remembering.

50 watts of RMS power per channel at 8 ohms, 20-20kHz, with all four channels driven. 125 watts per channel in stereo bridge mode. A THD and IM of less than 0.5% at rated output. An FM sensitivity of 1.9 microvolts. A discrete four channel receiver with matrix capabilities so you can use either type of quadraphonic material. And much, much more.[3]

We can offer so much because we have so much experience. We were one of the first in the audio field. And now we're applying all our knowledge, all our engineering skill to four channel.

Once you've proven to yourself which receiver has the best specs, move on down to that last line in the chart and compare Sylvania's price with all the others. Find out which one gives the most for your money.

We feel pretty confident you'll discover that the best-known names aren't necessarily your best buy.

[3]So much more that it won't all fit here. So send us a stamped, self-addressed envelope and we'll send you a four-page brochure on our four channel receivers.

GTE SYLVANIA

Sylvania Entertainment Products Group, Batavia, N.Y.

assistant superintendent of pressed metal bearings at Torrington Co. in Connecticut. He started work at Torrington in 1966 as a bearings division engineer. Later he was promoted from assistant foreman to foreman, to general foreman in three different departments in less than three years.

Odell, '67

1967

EUGENE J. BALDRATE is a senior engineer at Southern New England Telephone Co., New Haven, Conn. . . . Currently ROGER V. BARTHOLOMEW, S.J. is at Spring Hill College, Mobile, Alabama. . . . HUGO W. CROFT serves as a captain in the U.S. Army and is located in Palo Alto, Calif. . . . FRANCIS L. DACRI works as a senior engineer at E. I. duPont deNemours & Co., Old Hickory, Tenn. . . . PETER J. DICKERSON has joined the Badger Co., Cambridge, Mass. . . . JOSEPH F. GOULART is with the Ford Motor Co., Dearborn, Mich. . . . Presently RONALD A. JOLICOEUR is a self-employed manufacturer's representative in Worcester. He sells industrial ventilation and air pollution control equipment.

LEON E. KRALS is now senior materials engineer for Pratt & Whitney Aircraft, East Hartford, Conn. . . . ROBERT J. LOCKWOOD, a system engineer for Raytheon, Wayland, Mass., currently provides system consultant services to the FAA at Jacksonville Air Route Traffic Control Center. . . . ROBERT R. MICHELIN is senior associate engineer at IBM in Poughkeepsie, N.Y. . . . ARNOLD R. MILLER holds the post of general manager at Electro-Craft, Inc., Dorchester, Mass. Previously he was senior sales engineer for Eagle Signal, Davenport, Iowa. Recently he published "The Automation Dilemma: Choosing a Control Technology" in *Chilton's Instruments & Control Systems.* He has also presented papers at IEEE, ISA, and SPI conferences during the past few years.

PAUL J. MILNE, who recently received his PhD from Kansas State, is now employed at Merrimack College, North Andover, Mass. . . . LEONARD E. ODELL has joined the Hartford Insurance Group's life actuarial department as an associate actuary. He will be responsible for the development of new individual life insurance products. Earlier he was with State Mutual Life Assurance Company of America and Aetna Life and Casualty where he was an assistant actuary. In 1971 he became a Fellow of the Society of Actuaries. . . . JAMES E. SHEA is a systems engineer at Raytheon in Waltham, Mass. . . . NEIL M. SHEA has been appointed a physics instructor at Holyoke (Mass.) Community College. Currently he is working toward his PhD at RPI where he also earned his master's degree. . . PAUL G. TRUDEL works as a senior engineer at Bechtel Power Corp., Houston, Texas. . . . ELLIOT F. WHIPPLE is a first-year MBA student at Wharton School of Finance (University of Pennsylvania) in Philadelphia.

1968

Married: ROBERT J. GALLO to Miss Candace Costantino on November 3, 1973 in Torrington, Connecticut. The bride is a registered nurse at Charlotte Hungerford Hospital. The groom is a civil engineer with the State of Connecticut Public Utilities Commission. . . . DAVID B. MORRIS to Miss E. Diane Francis on October 7, 1973 in Upton, Massachusetts. Mrs. Morris is a kindergarten teacher in Lancaster. Her husband is a process engineer at Foster Grant in Leominster, Mass.

Born: To Mr. and Mrs. THOMAS J. PERARO a son, Christopher Thomas, on October 6, 1973. Tom, who is with Aetna Life and Casualty, Hartford, Conn., is working on his MBA at the University of Connecticut.

MICHAEL C. ANNON is with Stone & Webster, Boston. . . . ALBERT J. ATTERMEYER works at Norfolk Naval Shipyard, Portsmouth, Va. . . . ROBERT A. BALDUCCI will be assistant to the chief engineer at Torrington Company's proposed new plant in Sylvania, Georgia. He has worked as an industrial engineer for Torrington (Conn.) Co. since 1968. . . . PAUL G. BEAUDET is office engineer at J. A. Jones Construction Co., Charlotte, N.C. . . . DAVID P. CROCKETT serves as a sales engineer for Buffalo Forge Company in Cleveland, Ohio. . . . RONALD E. DANIELSON is a division manager at Danielson Flowers, Shrewsbury, Mass. . . . JEFFREY A. DECKER works as a senior appraiser-real estate investments at Prudential Insurance Co., New York City.

Presently H. PAXSON GIFFORD is supervisor-International Fuel Oil Movements for Texaco, Inc., New York City. . . . STEVEN C. HALSTEDT, who graduated from Amos Tuck School (Dartmouth) last year, is now a securities analyst for Travelers Insurance Co., Hartford, Conn. . . . Lt/jg RICHARD W. HEDGE is currently stationed with the Coast Guard in New Orleans, Louisiana. . . . JOSEPH F. HILYARD serves as director of corporate publications at Safety Electronics, Inc., Durham, N.C. . . . FRANK R. JENSEN is a technical support specialist at Digital Equipment Corp., Maynard, Mass. . . . ROBERT G. KOHM holds the position of group supervisor in production at DuPont Pigments Dept., Newark, N.J. . . . ROUMEN B. KORDOF, an associate of the Denver branch office of Connecticut General Life Insurance Company, has qualified for Honor Table, the company's highest honor for its field sales representatives. Honor Table membership is awarded to those whose professional skill in serving clients places them in the top 10 per cent nationally in performance among the company's career agents. Ron's specialty is in overall financial planning design for corporate business owners.

GEORGE H. LANDAUER is president of GDC Medical Electronics, Richmond Hill, N.Y. GDC is the instrumentation division of Generator Development Corp. . . . RICHARD H. LANG works as associate maintenance engineer at New England Power Co., Lebanon, N.H. . . . ROBERT MEADER now serves as a senior planner in the Fall River (Mass.) Planning Dept. Previously he was a planning specialist at Fall River Model Cities Agency. He and his wife, Betty, are the parents of a son, Robert, age 2½. . . . GEOFFREY P. TAMULONIS is with ITT in Ramsey, New Jersey.

1969

Born: to Mr. and Mrs. Jeffrey C. Knapp their first child, a son, Lindsey Clark, on August 1, 1973. Jeff, who is with LTP Enterprises, recently designed and helped to build the Knapps' new home in Rye, N.H.

JAMES P. ATKINSON works for the Metropolitan Area Planning Council in Boston. . . . DONALD E. CASPERSON is presently using the new LAMPF accelerator facility at Los Alamos, N.M., for research leading to his PhD in physics at Yale. . . . JOHN E. CONNELL, Jr., serves as an analyst programmer at Aetna Insurance Co., Hartford, Conn. . . . JOHN B. CZAJKOWSKI is a staff assistant at Bergere, Providence, R.I. Last year he received his MBA from Western New England College, Springfield, Mass. . . . CHARLES T. DOE works at State Mutual Life Assurance Co., Worcester. . . . JOSEPH E. DORAN, Jr., recently received his BSEE from the University of New Haven. He is vice president of Doran & Johnson Mfg. Corp., North Attleboro, Mass. . . . JAMES W. FOLEY is with Bell Labs., Murray Hill, N.J. . . . DOUGLAS J. GEORGE is currently with George Associates, Inc., Needham, Mass. . . . STANLEY J. GOLDMAN lectures on constitutional law and civil rights at Northeastern University, Boston. . . . JOEL P. GREENE has become associated with Anderson & Pentland, Attorneys at Law, Worcester.

PETER T. GROSCH is studying for his MBA at Emory University, Atlanta, Ga. . . . CHARLES D. HARDY, Jr., holds the post of senior design engineer at National Steel, San Diego, Calif. . . . Presently RICHARD H. GURSKE is project manager at VTN Consol, Inc., Irvine, Calif. . . . THOMAS M. GWAZDAUSKAS works for Artisan Industries, Inc., Waltham, Mass. . . . Air Products & Chemicals, Inc., employs ARTHUR T. KATSAROS as a senior process engineer in Allentown, Pa. . . . KENNETH W. KOPKA is now general foreman of grinding at Torrington Co., Torrington, Conn. Formerly he was assistant foreman of secondary operations. He joined the company in 1969 as a bearing manufacturing engineer. . . . DANIEL P. LORUSSO works in computer design at General Electric, Pittsfield, Mass.

ERIC H. NICKERSON holds the position of senior design engineer, connector products, at Texas Instruments, Inc., Attleboro, Mass. . . . PAUL V. NORKEVICIUS is studying for his MBA at the University of Massachusetts. . . . BIDYUT K. RATH serves as a designer with Stone & Webster, Boston. . . . DONALD W. RULE teaches as an assistant

Engineer, which do you want... field or desk? Westinghouse offers both.

Some of you fellows want to be where it's invented. Near a computer and a design desk. Fine. Westinghouse has one of the largest R&D operations in the country. And 112 plants here, 74 abroad.

But a lot of you want to get into the field. Fine. We're in everything from power plant startups to electronic systems trouble-shooting. It's an extensive, diversified list. Hardhat country.

You can be sure if it's Westinghouse. Write to George Garvey, Westinghouse Education Center, Pittsburgh, Pa. 15221. An equal opportunity employer.

Westinghouse

at the University of Connecticut. . . . ROBERT J. SCOTT is a planner for the city of Virginia Beach, Va. Recently he received his MRP from Cornell. . . . FRANCIS W. SKWIRA works as a proposition engineer for General Electric Co., Steam Turbine/Generator Marketing Dept., Schenectady, N.Y. . . . DAVID W. SWENSON is employed as a development engineer at Western Electric Co., North Andover, Mass. . . . THOMAS F. TAYLOR works for General Electric Co., Lynn, Mass.

1970

Married: RICHARD DIAMOND to Miss Barbara Marten on October 21 in Plainview, L.I., New York. A graduate of BU, the bride is a speech therapist in the Uxbridge (Mass.) school system. The bridegroom is affiliated with Peter Lumber Corp., Worcester. . . . GEORGE L. FISLER and Miss Shirley J. Shove in Milford, Connecticut on November 2, 1973. Mrs. Fisler is a senior at Southern Connecticut State College, New Haven. Her husband is a computer programmer analyst at Bridgeport Hospital.

Born: To Lt. and Mrs. JOHN JOLLS, a son, John Richard, on November 18, 1973 in Honolulu. Jack missed the great event since he sailed November 8 on the USS Seadragon for an extended duty tour in the Pacific.

CHARLES J. ANDRESON serves as a graduate assistant in WPI'S Civil Engineering Department. . . . ROBERT A. ANSCHUTZ is with G.E.'s Knolls Atomic Power Lab., Schenectady, N.Y. . . . JOHN T. BOK works as a sales engineer at Allen Mfg. Co., Bloomfield, Conn. . . . JOHN P. DEMASE received his MSME from RPI last year. . . . BERNARD J. DODGE has been named associate projects administrator at WPI. Recently he returned to this country after spending two years with the Peace Corps in Sierra Leone, South Africa, where he served as a secondary school mathematics teacher and librarian. . . . JOHN W. GEILS, Jr., and his nationally-known J. Geils Band, performed at Boston Garden last November. . . . DONALD W. HARDING works for Granger Contracting Co., Worcester. . . . ROBERT R. MATTSON, who received his MSME from WPI last year, is presently a team manager at Charmin Paper Products, Mehoopany, Pa.

Smialek, '70

CHESTER J. NAPIKOSKI is with EBASCO Services, Inc., Glenrock, Wyoming. . . . RANDY SABLICH serves as contract manager at Grumman Aerospace Corp., Bethpage, N.Y. . . . ROBERT L. SMIALEK, supervising engineer, Kemper Insurance Group of Rolling Meadows, Ill., was recently recognized at the Insurance Institute of America National Annual Awards Luncheon in Chicago for having achieved the highest grade among all those who took the Institute's Management Studies 41 examination during the May 1973 examination series. . . . ROBERT W. SOFFELL, who is located in Parma Heights, Ohio, is currently a development engineer for the Carbon Products Division of Union Carbide Corporation. . . . JAMES H. VerGOW works as a manufacturing engineer at Texas Instruments, Attleboro, Mass. . . . PAUL C. WILSON is a graduate assistant at the University of Connecticut in the Metallurgy Dept.

1971

Married: BRUCE W. BENNETT and Miss Sadie E. Taylor on October 20, 1973 in Rhode Island. Mrs. Bennett graduated from South Kingston High School. After attending WPI her husband graduated from Plus School of Business in Providence. . . . CARLTON E. CRUFF to Miss Linda M. Scieller on October 19, 1973 in Waterbury, Connecticut. ROBERT PACE served as best man and CREGG McWEENEY was an usher. The bride graduated from the University of Connecticut. The groom is serving in the U.S. Army Reserve. . . . GLENN A. TUOMI and Miss Debra A. Gavin in Vernon, Connecticut on October 13, 1973. Mrs. Tuomi is a Becker graduate and also attended Cardinal Cushing College, Brookline, Mass. The bridegroom is employed by the Barry Division of Wright Line, Inc., Worcester.

JOSEPH P. BELLINO is with General Electric Co., Schenectady, N.Y. . . . PAUL J. BIENICK works at Stone & Webster Engineering Corp., Boston. . . . FRANCIS J. CALCAGNO has been employed as a securities analyst for Irving Trust Co., New York City. . . . ARTHUR A. JACKMAN teaches at Keefe Tech., Framingham, Mass. . . . JOHN C. JOHNSON is chief of the bioinstrumentation branch, Bioengineering Division, U.S. Army Aeromedical Research Laboratory, Fort Rucker, Alabama. . . . PHILIP M. JOHNSON was recently employed as a coatings development chemist for optical products at Omnitech, Inc. (a subsidiary of Gentex Corp.). . . . 2/Lt. TIMOTHY C. JOHNSON has completed a nine-week air defense artillery officer basic course at the Army Air Defense School, Ft. Bliss, Texas. Last year he received his MS degree from Ohio State University in Columbus.

DOUGLAS A. KEILY now works at Combustion Engineering, Inc., Windsor, Conn. . . . WILLIAM G. LIGHT received his MS in chemical engineering last year from the University of California in Berkeley. He is now working for his PhD. . . . CARL T. NELSON is a development engineer at 3M Company, St. Paul, Minn. Recently he received his BSME from Kansas State University. . . . DONALD P. ST. MARIE works for Camp, Dresser & McKee, Boston. . . . ROBERT M. SINICROPE teaches mathematics at Milton Academy, Milton, Mass. . . . MARTYN H. STRONG is with KAPL, Schenectady, N.Y. . . . CALEB H. THOMAS, Jr., serves as a design engineer at Formation, Inc., Cherry Hill, N.J.

1972

Married: RICHARD L. LOGAN and Miss C. Lorraine Mullaly on August 18, 1973 in Worcester. Mrs. Logan is a graduate of Worcester State College and teaches in Framingham, Mass. The groom is a graduate student at Northeastern University. . . . JOHN C. MODZELEWSKI to Miss Christine Ann Sorenson on October 27, 1973 in Manchester, New Hampshire. The bride graduated from St. Vincent Hospital School of Nursing. She is a registered nurse at St. Vincent. Her husband is employed by the Department of Public Works in Worcester.

KENNETH C. ARIFIAN, EDWARD C. CLUKEY, BRUCE M. ETESON, DAVID HAYHURST, JAMES V. LACY, and ROY LINDBLAD are all doing graduate work at WPI. . . . CHARLES L. DESCHENES is with Frank Morrow Co., Providence, R.I. . . . MICHAEL J. EMERY serves as a process engineer at E. I. duPont deNemours, Camden, S.C. . . . THEODORE A. FREDERICKS is employed as a mechanical design engineer at Collins Radio Co., Richardson, Texas. . . . WILLIAM D. GOODHUE teaches chemistry at North Chelmsford (Mass.) High School. . . . VAHE KRIKORIAN works for Xerox Corp., Webster, N.Y. . . . PAUL LACOUTURE is an associate engineer at New England Telephone in Boston. . . . Raytheon Co., Waltham, Mass., employs DAVID J. McGORTY as an associate engineer.

MORGAN
CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1974 ENGINEERING GRADUATES

Set yourself down where the living is great, too.

Naturally, when you settle down to a career, you want to do it where you'll also enjoy living. That's Sikorsky in Stratford, Connecticut, home of the famous American Shakespeare Festival, set amid woody, hilly country near Long Island Sound, within easy access of New York City.

And naturally, you want to be where your long-term career prospects are excellent. That's Sikorsky too. We're in the forefront of advanced technology for VTOL (Vertical Take-Off & Landing) aircraft, at a time when these remarkable craft are being increasingly utilized commercially—in construction, short-haul transportation, exploration, film making, firefighting, traffic control and other areas.

Yes, VTOL technology is definitely a field of the future —yours, if you like. At Sikorsky you'll enjoy a stimulating professional environment where your ability is encouraged, recognized and rewarded, where your career can really take off.

We're now offering opportunities—at highly competitive starting salaries and excellent benefits—for Aeronautical, Mechanical and Electrical engineers in the following areas:

DESIGN (aircraft structures; propulsion systems; transmissions; rotor, hydraulic & flight control systems; electrical/electronic systems).

TEST AND ANALYSIS (structural, loads, dynamic, stress, mass properties, reliability/maintainability; electrical/electronic systems; technical computing).

MANUFACTURING ENGINEERING (planning, methods, processes).

For further information, see your Placement Office for our brochure and the date of our forthcoming campus interviews. Or write directly to Mr. Leo J. Shalvoy, Professional Placement.

Sikorsky Aircraft

DIVISION OF UNITED AIRCRAFT CORP.

STRATFORD, CONNECTICUT 06602

An Equal Opportunity Employer M & F

FRANK D. McMAHON works at Goodkind & O'Dea in Clifton, N.J. . . . Currently JOHN A. MINASIAN is a sales engineer at Data General Corp., Southboro, Mass. . . . GEORGE A. OLIVER holds the position of research scientist at Ford Motor Co., Dearborn, Mich. . . . RANDALL D. PARTRIDGE is with Mobil Research & Development Corp.,Paulsboro,N.J. . EDWARD SCHRULL is studying for his MS in nuclear engineering at the University of Arizona in Tucson. . . . Lt. STEPHEN A. WILKINSON commands a Water Purification Detachment for the U.S. Army Corps of Engineers at Fort Bragg, N.C.

1973

Married: DENNIS R. BELIVEAU to Miss Judith E. Barcheski in Fairfield, Connecticut on November 3, 1973. Mrs. Beliveau was a secretary with Harvey Hubbell, Inc., in Bridgeport. Her husband is a manufacturing engineer with G.E. in Auburn, N.Y. . . . DAVID S. BOWEN to Miss Jeannine M. LaBrake in Portland, Me., on September 29, 1973. The bride has been employed by W. T. Grant Co. The groom works for Travelers Insurance Co., Hartford, Conn. . . . CHRISTOPHER A. BRODERS and Miss Bonnie J. Sandy on September 22, 1973 in Shrewsbury, Massachusetts. The bride was a bank teller at Worcester County National Bank. The bridegroom works at Texas Instruments, Inc., Attleboro, Mass. . . . LEO BUCHAKJIAN, Jr., to Miss Elaine H. Triggs on October 20 in North Brookfield, Massachusetts. Mrs. Buchakjian is a registered nurse in the Surgical Intensive Care Unit at the Memorial Hospital, Worcester. Her husband is studying for his MSME at MIT.

Married: MARK J. CICHOCKI and Miss Kathy L. Beardsley on October 20, 1973 in Bridgeport, Connecticut. The bride attended the University of Bridgeport. The bridegroom is production control administrator with the General Electric Co. . . . MICHAEL DeCOLLIBUS to Miss Cheryl Nilles on November 10, 1973 in Sudbury, Massachusetts. Mrs. DeCollibus is a Becker graduate. Her husband is an industrial engineer at Raytheon in Andover, Mass. . . . FREDERICK C. LEVITSKY and Miss Marcia A. Rossik in Auburn, Massachusetts on October 20, 1973. Mrs. Levitsky was employed in the IBM department of Johnson Steel & Wire Co. The groom works for General Dynamics Corp., Groton, Conn. . . . JOEL S. LOITHERSTEIN and Miss Dianne B. Boyer last fall in Brookline, Massachusetts. The bride is a graduate of Northeastern University, Department of Allied Health. Her husband is doing graduate work at WPI.

Married: WILLIAM H. MAWDSLEY and Miss Beverly Ann Carr on August 4, 1973 in Shrewsbury, Massachusetts. Mrs. Mawdsley is a senior at Worcester State College. The bridegroom is an actuarial assistant at State Mutual Life Assurance Co., Worcester. . . . ROBERT G. NELSON, Jr., to Miss Janice A. Kazak on October 20 in Springfield, Vermont. Mrs. Nelson, a secretary, graduated from Becker. Her husband is a graduate student at WPI. . . . EDWARD F. PECZYNSKI, Jr., and Miss Christine M. Laskoske in Meriden, Connecticut on November 3, 1973. Mrs. Peczynski teaches in the Meriden public schools. Mr. Peczynski is an assistant engineer at Northeast Utilities Service Co. in Berlin. . . . ROBERT S. VEITH to Miss Lucinda Ann Stirlen on September 1, 1973 in Wilbraham, Massachusetts. The bride is a student at Springfield Hospital School of Nursing. The groom is employed by Thomas Taylor and Sons in Hudson.

BRUCE J. BAKER is a process engineer at DuPont in Towanda, Pa. . . . JAMES R. BUELL serves as a sales service representative at Wyman Gordon, Grafton, Mass. . . . DAVID L. BURKEY, THOMAS A. MIKOLINNAS, and ROSALIA SCHLAEN are all graduate assistants at WPI. . . . PAUL A. CHRISTIAN is a graduate student in the chemistry department at Stanford University in California. . . . JOHN F. CIRIONI has been employed by Foster Forbes Glass Co. . . . CHARLES A. DiMARZIO works for Raytheon Co., Sudbury, Mass. . . . DAVID HUBBELL is a student at Boston University Medical School. . . . DANIEL KAZARIAN serves as an intern for the Defense Dept. at Rock Island, Ill. . . . Torrington Co., Torrington, Conn., has employed DAVID A. KULCZYK as a manufacturing engineer in needle research.

PHILIP MEDIEROS has been named chief of nuclear test trainee and support at the General Dynamics Corporation, Groton, Conn. . . . MARK MOORADIAN is a graduate student at Harvard University. . . . WILLIAM J. NIERANOWSKI teaches mathematics in Milford, N.H. . . . LEONARD REDON, who works in the product development department at Eastman Kodak, was featured in a Kodak advertisement in the October 8, 1973 issue of *C & EN*. . . . PHILLY M. SADRI is with the Simplex Time Recorder, Gardner, Mass.

Completed Careers

JAMES E. SMITH, '06, founder and for many years president of the National Radio Institute in Washington, D.C., died in McLean, Virginia on September 30, 1973. He was 92.

The school, which has enrolled nearly a million students, is said to be the oldest home study electronics school in the nation. It was founded in 1914. Mr. Smith was president from then until 1956, when the school was bought by McGraw-Hill publishers and he became chairman of the board.

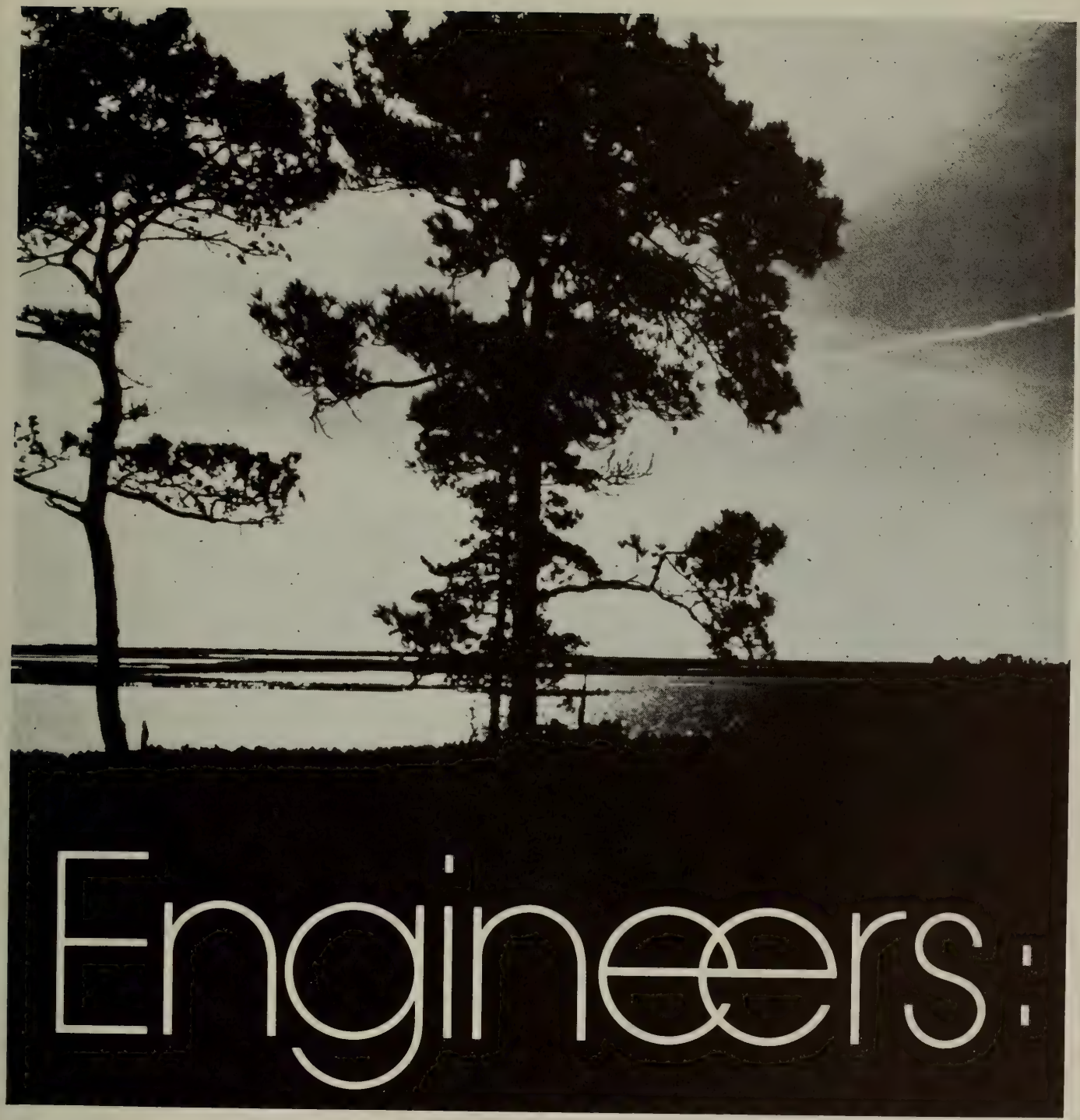
After graduating from WPI as an electrical engineer in 1906, Mr. Smith went to Washington to teach electrical engineering at McKinley High School, where he built a receiving station in 1910 and introduced wireless radio to public schools.

In 1917, when the United States entered World War I, he became director of radio instruction at Howard University where he trained 800 wireless telegraphers, many of whom joined the Army Signal Corps.

For his outstanding professional achievement Mr. Smith was given the Robert H. Goddard Award in 1965, and in 1969 he received an honorary doctor of engineering degree from WPI. He was also cited by the National Home Study Council Hall of Fame and given the International Knight of Achievement award.

He belonged to AIEE, IRE, and Phi Sigma Kappa. He also was a Fellow of the Radio

jamesbury
manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves
Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605



Help bring a better environment to everyone's life...

The Corps of Engineers offers exceptional positions of challenge and professional satisfaction to engineers who want to help solve critical environmental problems so all our people can enjoy cleaner, healthier and more productive lives. For the engineer who wants to take part in new, more advanced, extremely challenging engineering/construction projects, the opportunities are virtually limitless. The Corps' activities today include the broadest sweep of professional demands—planning, design, construction—water resources development, navigation and flood control projects, construction of hospitals, family housing, manufacturing plants, missile and space exploration facilities, research in Corps laboratories related to these programs—you name it! This is the organization for the engineer who wants to do things, plan things, become involved, grow—starting right now. If you're a doer, and you want to be where the action is, write to us today. We'll tell you all about the advantages of a civilian career with the Corps of Engineers. An equal opportunity employer.

CORPS OF ENGINEERS DEPARTMENT OF THE ARMY, WASHINGTON, D.C. 20314

Club of America, chairman of the advisory board of the D.C. area YMCA and president of the Round Table of Washington. He was past president of the Washington, D.C. chapter of the Alumni Association. He was the father of J. Morrison Smith, '37.

JOHN BARNARD, '13, a retired investment broker, died November 4, 1973 in Weymouth, Massachusetts.

He was born March 8, 1891 in Worcester, and graduated from WPI as an electrical engineer in 1913. Until his retirement in 1955, he was an investment broker for F. S. Moseley Company of Boston. At the time of his death he was serving as a trustee of the company.

Mr. Barnard was a member of the Union Club of Boston, a former president of Rogerson House, Boston, and a member of the executive committee of the New England Deaconess Hospital. He belonged to Skull and Theta Chi Fraternity.

ASA HOSMER IV, '14, died September 30, 1973 at Hartford (Connecticut) Hospital. He was 81.

Born in Baldwinville, Mass., he went to work for the Factory Insurance Association of Hartford after graduating from WPI as a mechanical engineer in 1914. He lived in Charlotte, N.C. for 32 years successively as inspector, engineer and as southern field manager for the Association. He was transferred to the Hartford office as a senior engineer in 1951.

While in Charlotte he was prominently identified with the insurance and engineer groups and was a president of the Charlotte Engineers Club and chairman of the local section of the ASME. He was a registered professional engineer in North Carolina. He retired in 1959.

Mr. Hosmer belonged to the Old Guard of West Hartford.

FRANCIS T. McCABE, '16, of Cambridge, Massachusetts died on November 18, 1973 at the age of 79.

After studying at WPI, he received his BS from the University of Maine and his EdM from Harvard University.

For a number of years he served as a teacher of physical science and head of the department at Rindge Technical School, Cambridge, Mass. He was a member of ASME, MAAT, and SPEE.

JAMES C. WALKER, '16, a life trustee and former executive vice president of WPI, died October 28, 1973 in Pinehurst, North Carolina. He was 79.

He was a native of Amesbury, Mass. In 1916 he graduated as a chemist from WPI. During World War I he served in the U.S. Navy as an ensign in the Balloon Corps. Until 1929 he was associated with the American Woolen Co. From 1929 until 1960 he was with Sandoz, Inc., New York City, an international chemical company. At his retirement he was executive vice president and chairman of a company management committee.

In 1961 he was appointed executive vice president of WPI and served 13 months. During that time he was interim president, between the terms of Arthur Bronwell and Harry Storke.

Mr. Walker was a member of Sigma Alpha Epsilon Fraternity and a charter member of the American Association of Textile Chemists, Colorists. He received an honorary doctor of science degree from WPI in 1957.

CLYDE T. HUBBARD, '17, died on November 23, 1973 in Boston at the age of 80.

Following his graduation from WPI as a civil engineer, he joined the Bell Telephone Co. of Pennsylvania. From 1924 until his retirement in 1953 he worked for the New England Telephone & Telegraph Co. He retired as division plant engineer-Western Division.

Mr. Hubbard belonged to Theta Chi, Tau Beta Pi, the Telephone Pioneers of America, and the Tech Old Timers. He was a professional engineer in the state of Massachusetts.

PHILIP H. SHERIDAN, '17, died October 6, 1973 in St. Petersburg, Florida.

He was born in Grafton, Mass., on May 16, 1895 and later studied at WPI. For many years he was with Crompton & Knowles Loom Works, Worcester, where he served as assistant foreman.

MYRON D. CHACE, '21, died on October 18, 1973 in Arlington, Massachusetts.

He was born in Worcester on February 20, 1897, and graduated in 1921 as an electrical engineer from WPI. From 1922 until 1962 he worked for the New England Telephone & Telegraph Co. where he retired as a general toll engineer.

Mr. Chace was a member of Phi Sigma Kappa Fraternity. He was a registered professional engineer in the state of Massachusetts and a member of the Telephone Pioneers of America.

MAURICE KORNBLUT, '22, passed away on November 18, 1973 at his home in Ansonia, Connecticut. He was 73.

A native of Ansonia, he later attended WPI and graduated from New York University Law School in 1921 following service in World War I. After being admitted to the Connecticut bar, he practiced law in Ansonia for 52 years. Twice he was the prosecuting attorney of the City Court.

Active in the former Ansonia Jewish Community Center, he was also past president of B'Nai B'Rith.

LEON E. HADLEY, '23, of Fitchburg, Massachusetts, passed away on September 30, 1973.

He was born on May 4, 1901 in Leominster, Mass. He studied mechanical engineering at WPI. For many years he worked as an estimator at Simonds Saw & Steel Co., Fitchburg.

Mr. Hadley was a member of Phi Gamma Delta Fraternity.

NORMAN A. BERGSTROM, SR., '25, passed away very suddenly of a heart attack on October 1, 1973 in New Jersey. He was 72 years old.

He studied electrical engineering at WPI. In 1963 he retired as a supervisor in the Long Lines Dept. at the American Telephone & Telegraph Co. in Princeton, N.J.

DANIEL A. HOWE, '25, died November 23, 1973 at his home in Needham, Massachusetts. He was 68.

He was a mechanical engineering student at WPI. For many years he was employed by Stone & Webster in Boston. He belonged to Theta Chi Fraternity.

WILLIAM F. RONCO, '25, passed away on September 22, 1973 in Mt. Kisco, New York.

He was born on January 17, 1903 in Clinton, Mass., and later became a student at WPI. For many years he was in the electrical business in Mt. Kisco.

EDMUND F. ROTHEMICH, '34, of Worcester died as the result of injuries sustained in an auto accident last October.

He was born on August 16, 1913 at Schenectady, N.Y. In 1934 he graduated as a civil engineer from WPI and joined Riley Stoker Corp., Worcester, where he was employed as manager-customer service department at the time of his death.

Mr. Rothemich was a member of Theta Chi Fraternity and ASME.

KINGSTON C. SMITH, '35, passed away during open-heart surgery at Yale-New Haven Hospital on May 28, 1973 in Connecticut.

He was born on September 25, 1911 in Rockville, Conn., and received his BSEE from WPI in 1935. During his career he was affiliated with New England Power Service Co., Curtiss-Wright Corp., Monsanto Chemical Co., and Gouverneur Talc Co. For many years he was with Sikorsky Aircraft, Stratford, Conn., where he held several positions including those of plant electrical engineer and plant mechanical engineer.

Among the organizations of which he was a member were Lambda Chi Alpha Fraternity, AIEE, and AIME. He was a past president of the New Haven Chapter of the Alumni Association.

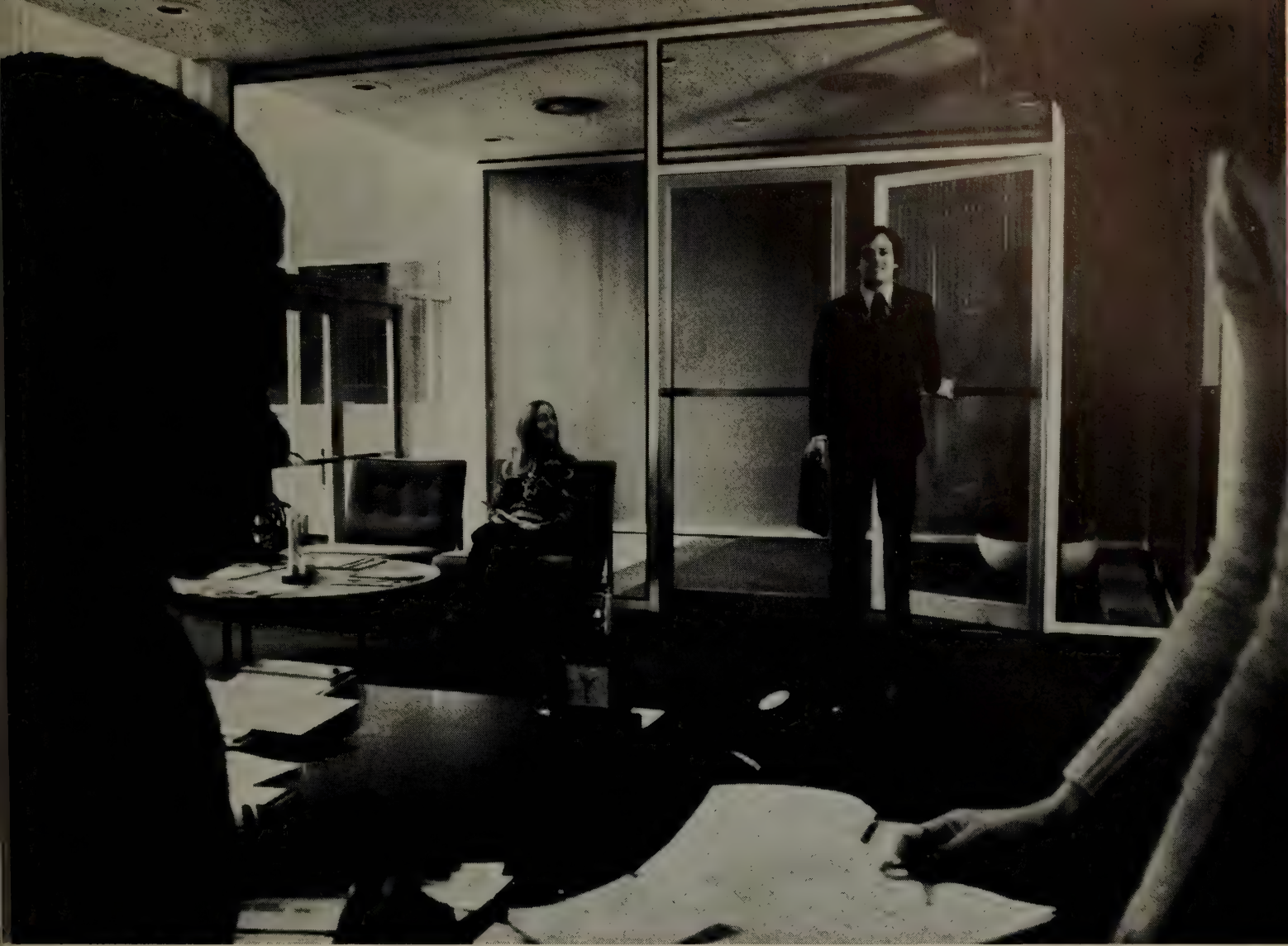
JOSEPH P. MANNA, '46, a long-time resident of Duquesne, Pennsylvania, died on September 5, 1973.

He was born on December 22, 1920 at Franklin, N.J. After graduating as a mechanical engineer from WPI, he joined Joseph E. Seagrams & Sons from 1947 to 1952. Later he served as supervisor-fuel and instruments for U.S. Steel at the Duquesne (Pa.) Works.

Mr. Manna belonged to ASME and ISA.

ROBERT A. SHEIMAN, '71, was killed while on duty with the U.S. Army in an auto accident in Stuttgart, Germany on June 20, 1973.

He was born on April 21, 1949 in Rochester, N.Y. He graduated as a chemical engineer from WPI and belonged to AICE.



Nobody can guarantee your future. Not even Monsanto. But...

If you're an engineering student and believe in yourself and your ability... you could be one of those who will walk through the Monsanto doors into a lasting and rewarding career. Soon. There's no better road to a successful future.

Monsanto operates in a very competitive field. We need innovative engineers to help us stay ahead of that competition.

There are openings at Monsanto for graduates in all fields of engineering who are just approaching their life's work. What you need most with your degree is a firm idea of what you want to do with your life and your willingness to work for it. Hard.

If you think your credentials and goals are in tune with our needs; if you've got a career in mind and the motivation to achieve—we invite you to look at our company. You could start something that will last a long time.

Write to George C. Crook, Manager, University Relations and Professional Recruiting, Corporate Personnel Dept., 800 North Lindbergh Boulevard, St. Louis, Mo. 63166.

Monsanto

An equal opportunity employer.

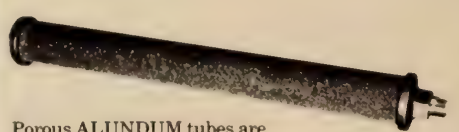
Norton micro-bubbles can minimize your troubles.

Norton Aeration Systems are part of a $77 million, 3½ year program designed to increase the efficiency and capacity of New York City's Ward's Island waste water treatment plant. The upgraded, secondary treatment facility, designed to remove 90% of solids, will serve the upper East Side and part of the Bronx.

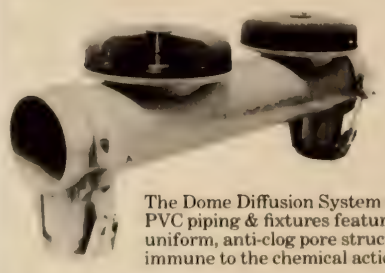
After 35 years of service by a Norton Aeration System at New York City's Ward's Island waste treatment plant, a similar Norton system will be furnished as part of plant upgrading. The in-going system will feature ALUNDUM™ porous media of the same type which has provided a constant, consistently smooth-flowing diffusion of fine bubbles to the plant's aeration tanks and distribution channels over the years.

Today's updated Norton line offers complete systems of ALUNDUM porous ceramic discs, plates, and tubes plus the Dome Diffusion Systems complete with PVC piping and fixtures. A uniquely uniform pattern of pores in the ceramic, through which clean air is fed, makes possible excellent oxygen transfer efficiency. With proper installation, the possibility of clogging is precluded.

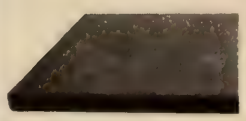
Many municipalities are breathing new efficiency and economy into waste treatment with Norton Aeration Systems ... in both new and upgraded installations. Write for details before planning your next plant. Norton Company, Industrial Ceramics Division, New Bond Street, Worcester, Mass. 01606.



Porous ALUNDUM tubes are available in a wide selection of wall thicknesses and lengths. All media can be supplied in various grades of permeability to meet individual requirements.



The Dome Diffusion System complete with PVC piping & fixtures features a highly uniform, anti-clog pore structure and is immune to the chemical action of sewage.



ALUNDUM plates are available with full bevel, half bevel, straight, and rabbeted edges.

NORTON INDUSTRIAL CERAMICS

APRIL 1974

wpi journal

THE FRATERNITIES

WPI journal

Vol. 77, No. 6 April 1974

2 **Feedback**

3 **On the Hill**

4 **The WPI Fraternities Today**
a long look at the situation of the Greek houses on campus

5 **Changing Times**

6 **Why Join?**

9 **More than Just Social Life?**

11 **Landlord and Taxpayer**

12 **Offical Viewpoints**

16 **The Houses Today**

20 **Now You See it, Now You Don't**
investigations into subjective color—produced from black and white

23 **Your Class and Others**

32 **Completed Careers**

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, Chairman; Donald F. Berth, '56; Richard DeChard, '56; Robert C. Gosling, '58; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography and printing: Davis Press, Worcester, Massachusetts.

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1974 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. Postmaster: Please send form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

WPI Alumni Association

President: W. J. Bank, '46

Vice Presidents: L. Polizzotto, '70; F. S. Harvey, '37

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr., '44

Executive Committee Members-at-Large: C. W. Backstrom, '30; B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55

Fund Board: R. F. Burke, Jr., '38, Chairman; W. J. Charow, '49, Vice Chairman; L. H. White, '41; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

feedback

Letters to the editor are welcome. All points of view can find a forum in this section, and we encourage the exchange of ideas and opinions here. For reasons of space, variety, timeliness, and interest to other readers, we may not publish all letters received and will occasionally excerpt portions of letters, but those that do appear here are an accurate reflection of our mail.

Readers Chill Blaine

This letter may never appear on the printed pages of the Journal but, at least, the writer will have the satisfaction of writing it.

The writer does not know Joseph W. Blaine '42 who wrote the diatribe which appeared on "Feedback" in the February issue so that his remarks herewith are obviously impersonal. The writer feels that Blaine's letter was ill-considered and mildly abusive. It was read by him with rising indignation and the feeling that some sort of rebuttal should be made.

While the writer has never had any direct connection with the modern WPI Journal he does have a certain ancient connection with it. In 1911-13 he became sophomore editor of the old-time Journal under the friendly guidance of Dr. George H. Haynes, of memory, who was the guiding force behind its make-up and publication. In the years immediately following the writer became junior and then senior editor. This was in the early days when Dr. Haynes appointed a man from each of the three upper classes to care for the business affairs of the Journal and an equal number for editorial duties.

No one is perfect and departures from the ideal are frequently encountered in most of our modern publications. Errors and inadequacies are bound to creep into any enterprise which involves the written word. It goes without saying that everyone cannot be pleased. And, again, what pleases one may not please another.

The writer has been critical at times of the modern Journal but never to the point of committing his feelings to written comment. He found for instance that to his mind the Alpha and Omega article was incomprehensible but refrained from commenting on it, although others did, pro and con. For the most part the Journal is an excellent vehicle of communication between Tech and its alumni. It serves most of its intended objectives efficiently and well. The writer looks forward to each issue with pleasurable anticipation.

Mr. Blaine says midway in his letter that "since about 1968 I have not had the slightest interest in WPI". If this is true it seems strange that he would take the time and effort to write his lengthy letter. He must have had some slight interest as he obviously has been reading the Journal in the six years that have elapsed since 1968.

It is interesting to note that, with all his criticism, he makes no constructive suggestions for the improvement of the Journal or, for that matter, of WPI. He deplores the use of "unused white space". So-called white space in the writer's opinion can lend balance and dignity to any publication if judiciously used. In this connection the writer well remembers a Tech Banquet of at least sixty years ago. A well known figure, whose name has now passed into limbo, was the principal speaker. In the course of his remarks he referred critically to the attractive banquet program which was printed on a single sheet of paper which had been folded twice to make a neat and attractive four page leaflet. The speaker said he was very surprised that a leading technical school would have permitted the inefficiency inherent in the design of the program inasmuch as it utilized only half of the paper involved. (Actually it was fifty percent "white space".) At this juncture the same Dr. Haynes rose and interrupted the speaker abruptly. In his quiet, characteristic way he said, "We designed it this way for efficiency and economy because it only had to go through the press once."

M. G. Steele, '15
Rome, N.Y.

I read with interest the letter written by Mr. Blaine in the February issue of the WPI Journal. He brings up several points which are worthy of comment.

To begin Mr. Blaine accuses the Institute in general of "degenerating beyond recall," and while this is his opinion he also states that the WPI way was archaic when he graduated. If he had been informed as to the happenings on campus he would have known that since 1968 several interesting and unique changes have taken place. The archaic system he mentions has been revised substantially. The school is attempting to bring purpose and relevance back into its curriculum. In short he has condemned the system which produced him and is also condemning the people who are changing it. A most admirable bit of confused logic—which may prove his first contention.

The school probably changed the most during my four years as an undergraduate. It went from a traditional engineering school to a progressive and individual institution. Yes, there were some problems with the conversion, but making a change of this type not only means changing the physical layout but some thinking as well. While I was not on the Plan I believe that the concept which it is attempting to instill is valid. An engineer who is able to interact with his environment in a positive way will greatly aid technology as a whole.

Your publication is a reflection of the change that has taken place on campus. I believe that is what your purpose should be—to reflect WPI as it is now with a balance accorded to the traditions and accomplishments of its alumni. If Mr. Blaine had spent more time reading the Journal he might have been able to see that the college is moving to make itself less archaic. I might add that it seems to have worked, in that our freshman enrollment was down slightly at 500+ students while other engineering colleges are being forced to schedule courses every other year for lack of students.

Joseph J. Magri, '73
Roslindale, Mass.

Our Name Again!

Some time ago, some one complained about the size of the title on the cover of the Journal, it seems that the letters, WPI, were lost. Recently, I received a magazine with the word Journal in large letters. I opened it and noticed all those Norwegians and realized that it was a North Dakota publication. The latest Journal is improved in the matter of title, but somehow, you people could do better. My youngest daughter is a student at Brown. As a parent, I receive the Brown Alumni Monthly. There is only one word that stands out—Brown. I like that.

I have been meaning to tell you that the innovations taking place at Tech sound exciting and stimulating. Anyone who believes that the engineering education of those youngsters is being watered down has a dim concept of what is really happening! In fact, there is only one thing that excites me more, and that is the unveiling of Richard the nixon!

Thomas R. d'Errico, '41
Fargo, N.D.

on the hill

WPI Sports—NOT in the News?

One of the most frequently asked questions of Association secretary-treasurer Steve Hebert, '66, as he travels across the country is why WPI sports scores aren't carried in newspapers across the country.

A large number of people want to see the figures for WPI, particularly for football and basketball, and apparently few newspapers carry the information. They have it available, Athletic Director Bob Pritchard assures us, on both the AP and UPI wire services.

So if you aren't hearing about WPI sports in your local newspaper, wherever you live, the best thing you can do is to let *them* know what you want. If enough people pester any paper, they'll print the scores just to get rid of your phone calls.

Dean of Admissions Resigns

Kenneth Nourse, head of admissions at WPI for nine years, has resigned to become director of public affairs at Middlebury College, Middlebury, Vermont, his alma mater.

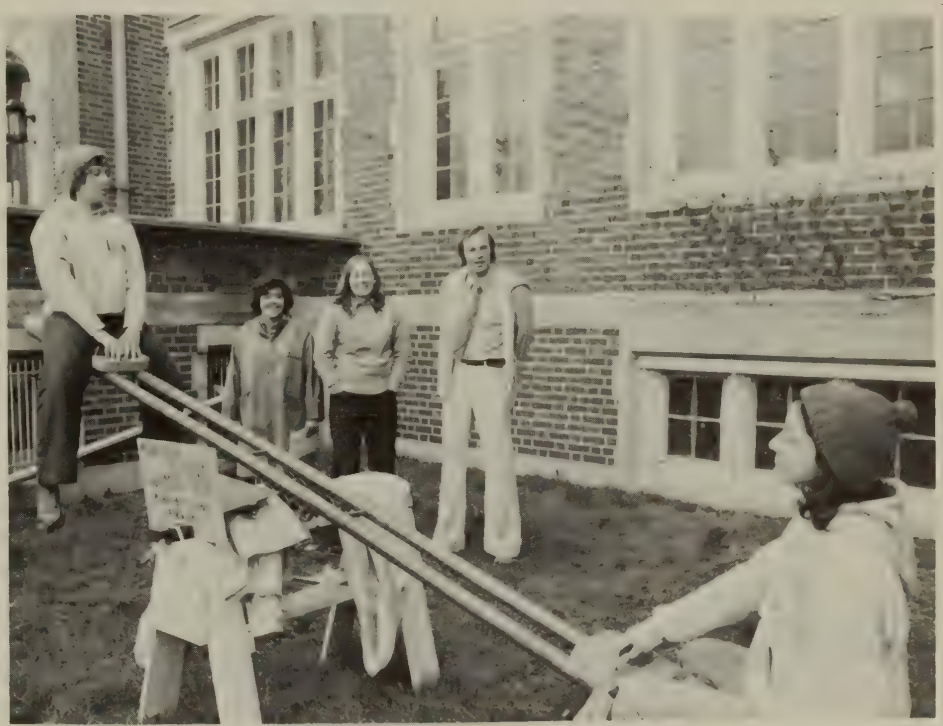
Dean of Students Donald Reutlinger, in announcing the resignation, stated that, "having come to us from Clarkson College to organize our first admissions office, his planning, counsel, and encouragement have brought nearly a decade of classes to WPI. As one of the senior admissions officers in New England, in point of service, his dedication, resourcefulness, hard work, and optimism will be sorely missed."

Goodwin Named to Head New Social Science Dept.

Leonard Goodwin, a research associate in the governmental studies program of the Brookings Institution, Washington, D.C., has been appointed to head up a new department of social science and policy studies. The present economics faculty of WPI will join three new faculty hired to provide expertise in other social-science areas in the new department.

The new faculty will be working at the boundaries between technology and other areas of human endeavor—politics, psychology, sociology, bureaucracy. The emphasis will be not so much on specific educational backgrounds as on interest in the interfaces among the areas. The department will be undergraduate in scope, offering basic courses in its fields and participating in a major way in interactive projects. It will be responsible for the existing major program in economics and whatever other programs may be generated in others of its areas.

Leonard Goodwin, the new head, holds bachelor's degrees in mathematics, physics, and English from the University of Michigan. He has a master's in educational psychology from the University of Chicago and has done graduate work in social psychology at Brandeis and Columbia. His first book, *Do the Poor Want to Work?* was published in 1972, and another, *Can Social Science Help Resolve National Problems? Welfare, A Case in Point,* will be published next spring. He has taught at Earlham College and has worked in industry as a research engineer and physicist.



See Saws Sell Shells

While seesawing is not your average college student's normal occupation, two members of the women's crew team spent ten hours riding up and down in a marathon effort to raise money for a new rowing shell.

The project was conceived in the brains (and executed by the seats) of Kristina Perry and Lexy Chito, both freshmen (freshwomen? freshpeople?). With a seesaw borrowed from the Worcester Parks Department, the pair set out to collect the $250 which was pledged. The day began gray, turned rainy, and finished up with a downpour in the middle of the afternoon. For a while the women were coming down into three-inch-deep puddles, until a campus carpenter took pity on them and brought out some duckboards.

Passersby contributed another $100 to the fund. The shell they are working toward costs $4,400, or about $6 an inch, so they now have about five feet worth.

When the long, wet, tender day finally ended at 8:00 in the evening, Tina and Lexy were barely able to stagger off home. Reliable reports indicate that neither did much sitting that weekend.

The WPI fraternities Today

For most WPI graduates, fraternity membership was a normal part of their college experience. In fact, up until about five years ago, around 80 percent of all WPI students were affiliated with one or another of the twelve fraternities.

But in the last few years the situation has changed dramatically, to the point where now only about 40 percent of eligible students are joining the fraternity system. Admittedly, in the same time period the male enrollment in the freshman class has increased from 325 to 500.

With this in mind, we are devoting most of this issue to the fraternity system at WPI—its present status, activities, problems, and some looking toward the future. On the following pages we will examine various aspects of fraternity life at WPI through the viewpoints of the people involved. Toward this end, in February the Journal convened a discussion group of some twelve people, each of whom spoke from a different point of view. All but two of the participants are, or have been, intimately involved with the fraternities at WPI.

A brief description of the people involved in the making of this fraternity issue is in order. They are:

John van Alstyne, dean of academic advising and former advisor to the IFC, who moderated the discussion.
Gary Balboni, senior, president of Phi Gamma Delta.
Bernard Brown, associate dean of student affairs.
Danny Funk, freshman, pledge at Phi Gamma Delta.
Bill Giudice, sophomore, non-fraternity member.
Alexander Gordon, '36, treasurer of the Alpha Epsilon Pi alumni board.
William R. Grogan, '46, dean of undergraduate studies and past national president of Phi Kappa Theta, current advisor to PKT.
Frances Harvey, '37, WPI trustee and Phi Kappa Theta alumnus.
Stephen Hebert, '66, secretary-treasurer of the WPI Alumni Association, president of the Cluverius Society (the alumni IFC), and Sigma Phi Epsilon alumnus.
Mike Parker, junior, president of the Interfraternity Council, and member of Lambda Chi Alpha.
Brad Thatcher, sophomore, non-fraternity member.
Robert Wilcox, executive director of Phi Kappa Theta national fraternity.

Changing Times

THE MOST SIGNIFICANT fact of life for WPI fraternities today is that they are in a period of change, readjusting to a larger student population and to the new educational approach of the WPI Plan. While the total number of fraternity members is about the same as before, only about 40 percent of eligible students are pledging fraternities today, half of what it used to be. What are the reasons for this decline? And what does it mean for the future of the fraternity system?

There are two factors operating here. One is a national trend among college students away from fraternities. The other is the changed situation at WPI.

Locally, the WPI fraternity system has had to contend with a significantly larger entering freshman class in recent years (540 in 1973 vs. 390 in 1966), with a greater variety of WPI operated housing available to students, with WPI's reorganization of the entire educational structure, and with many more social and recreational activities made available to students by the college.

OF THE NATIONAL situation, Robert Wilcox, executive director of the Phi Kappa Theta national, has this to say:

"Fraternities across the country, all nationals, have shown cyclical trends. My guesstimate would be that the bottom of the current cycle was about 1971, and the bottom of another cycle was World War II. We, and the other national fraternities, would classify the current situation as equal to or worse than the World War II crisis. At that time the problem was basically manpower. This time it was the loss of members because of ideology, and because in one sense fraternities represent the establishment.

"Everyone is experiencing a tremendous resurgence of interest. It is greatest in the South, which never really felt the terrible crunch that hit the Northeast and the Far West. But even at schools like the University of Wisconsin and the University of California at Berkeley, interest and membership are up."

Wilcox also comments on the support fraternities can give one another – but often don't. "Fraternities, I think, are their own worst enemies. There's always infighting to some extent, and back-biting and so on, especially in the IFC organizations. And that's unfortunate. If there is an 'enemy' (if we want to use that word of language), it would be non-fraternity men. It's not the other Greek houses, although for some reason we always look to each other and say that we've got to get more pledges than XYZ fraternity. We've got to beat them out in every respect.

"Healthy competition is OK up to a point, but not when we're talking about our very lifeblood in terms of new membership. I know there are some fraternities on the WPI campus that don't have full houses. Maybe if the IFC sat down and took a good hard look at the overall approach to rushing, some of the bigger and more successful houses could help the smaller ones. The thing is that it hurts the entire fraternity system for one house, just one house on campus, to be doing poorly. And I think a lot of that can be eliminated with cooperation. I notice a tremendous amount of cooperation on the national level."

Dean of Students Donald Reutlinger has said that he doesn't think the student body can support twelve fraternity houses any more. And one of the twelve, Alpha Epsilon Pi, is in serious financial trouble. Several consecutive years of small pledge classes were aggravated by a lack of undergraduate leadership and a moderately unsavory reputation. AEPi has been unable to meet the heavy tax and mortgage burden of a new house built in 1969. WPI owner of AEPi's mortgage, has had to foreclose.

Thus the stresses of change have had a definite impact on the WPI fraternity system. How well the system is able to cope with these changes and the problems presently confronting it will determine the direction of WPI fraternities for some years to come.

FRATERNITIES AS MEMBERSHIP GROUPS

Why Join?

WHY JOIN, INDEED? Membership, obviously, is the lifeblood of the fraternity. Each year the twelve WPI houses make a concerted effort to recruit some 230 new members, primarily from the entering freshman class. Without this influx of new members, the fraternities would soon go out of business – in both economic and social terms.

But what is the basis for their attraction? Why should an entering student join the minority of fraternity members? Is it the attraction of house living and the camaraderie that seems built-in? The promised social life? The availability of other members (particularly upperclassmen) for help with studies when you're in a bind? In fact, it would seem to be all of these and more.

Steve Hebert, '66, secretary-treasurer of the Alumni Association: "When I entered as a freshman in 1962, people pledged more out of necessity than I believe is the case today. We joined a house because that was where the action was, whatever action there was."

Danny Funk, freshman, pledging Phi Gamma Delta: "When I looked at fraternities I decided that, unless I joined one, I might draw myself into a shell and become something I didn't want to. The fraternity would force me to be outgoing, meet people, to live with other people, which I always felt was what life was all about."

Gary Balboni, president of Phi Gamma Delta: "Primarily, people come to WPI for an education the book-learning education we're all familiar with. And anybody in this kind of pressure situation needs some relief. The fraternities can provide that relief, that extracurricular activity. And that's why, during rush, you're not going to see a picture of somebody studying, or exams laid out on a table, but instead rush books, maybe showing football games we've had or the parties. In recruiting new members, I think the fraternities try to present an overall view of what *extra* you can get from your time in college.

"It's too bad, in a way, because I don't think I could have done as well in this school if I didn't have this fraternity behind me. You have a tutor in every field of education – mathematics, physics, chemistry – you've got upperclassmen majoring in everything. You've got somebody you can go to who's right there, who will give you his time without question, any time of the day or night. And that's something hard to find outside the fraternities. You can't find professors in this school that will give you that kind of attention, but you can find students living in the next room who will. And sure, the guy living next to you in the dormitory might be able to help you in one thing, but where's the guy who can help you in the next subject?"

This particular argument carries some weight at WPI. Because of the historical pattern of most students joining fraternities, WPI-owned student housing has always been somewhat scarce. Only this year, with the opening of the Ellsworth and Fuller residence complexes, has the supply even begun to approach the demand. With all entering freshmen guaranteed dormitory rooms, 1,500 upperclassmen must compete (in a lottery) for the 500 or so remaining vacancies. And they must compete again every year, a situation which has caused no little resentment among students who want to retain their present rooms for the following academic year. So the fraternity, with its guarantee of renewable housing, has some significant attractions just from that point of view. And since it is in the upperclassmen who are short-changed on domitory housing, it is in the fraternities and not the dormitories that one will find upperclassmen in large numbers.

Mike Parker, president of the Interfraternity Council, member of Lambda Chi Alpha: "The fraternity process is getting people to learn to live with other people. When it comes to fraternities, I'm something of an idealist. I think fraternities teach the lesson that no one person can do it all alone. You need people when you get out into society, when you leave WPI. You're going to have to be constantly working with other people. You can't just do everything on your own. In one way, too, the fraternity doubles as your family when you're away from home.

"Also, you have a constant change; every year there are new people coming in and seniors leaving. At times it provides for a lack of continuity. You wind up making the same mistakes someone else did. But you're meeting different people, seeing their problems, using your experience. And I haven't seen very many guys come into the house with a problem that somebody else hasn't had before."

ANOTHER WAY of asking the question at hand is: Why *don't* students join fraternities?

Bill Giudice, sophomore, non-fraternity member: "I looked into pledging one of the fraternities, but I didn't like the idea of doing things exclusively with the house. Several of my friends joined that fraternity, and that was the main reason I was going to pledge. And now those friends don't do anything except with their brothers. It's a cliquish thing.

"I don't think that just hanging around with the brothers is going to provide me with the social growth I look for in school. Also, I don't like the idea of pledging. The whole first-year program is not something that makes it attractive to join a fraternity: having to go down and learn all the brothers' names because they forced you to, and get their signatures and know their girlfriends and know their towns. And hell week. It's not the kind of growth I'm looking for.

"If you join a fraternity, you're sort of cutting yourself off. You eat dinner with the house; you go bowling with kids from the house; and that's because you're living with them. You're not forced into situations where you have to go out and find some other friends. When you're not in a fraternity, you do have to go out; you don't just call down the hall. You have to go out and visit some friends, and maybe they have some other friends over. It's more a process of being able to look toward the horizon."

Brad Thatcher, sophomore, non-fraternity: "The fraternity, in my mind, is instant friends, instant buddyhood, plus it's a place to live, which last year was kind of shaky because they didn't have the other dorms. But I decided that I already had a million friends, that I didn't feel I needed more, that I was fairly stable the way I was. I also wasn't as interested in the extra activities that fraternities seem to represent. You can still go to parties and things without being in a fraternity. And I guess I was sort of scared of all the obligations that come along with a fraternity; you're obligated to participate in an awful lot of activities.

"My roommate was pledging, and he had a little book with all the brothers in it. He had to learn their girlfriends, and where they're from. And he did go to a fraternity, and I wondered: When I get out of school, what fraternity am I going to join then so I can have people around to help me . . . to tell me everything is OK? If you're not in a fraternity and you want to do something, you have to go scrape up somebody to do it with. And you run into more people that way. At the same time, you might be unsuccessful in finding someone, and if you're generally that type of person you probably should join a fraternity. I feel there are two types of people. The type that definitely is happiest in a fraternity, that needs or wants or almost has to be in a fraternity to be happy. And there's another set of people who are different, who really don't feel they belong in that type of environment. You're always going to have the two types, and I don't think the difference has anything to do with intellect."

WHAT ABOUT the students who do join the fraternities, the 40 percent we're studying?

John van Alstyne, dean of academic advising: "I keep hearing the Plan is attracting a different type of student. And it's not the kind of student that some fraternities say they want. Now the question is, What's wrong with them? Is it that the student isn't the kind of person who's socially oriented? Or is it that the fraternity is just not with it? You must have heard that in your IFC meetings, Mike, when you're talking about the traditional meat market, dividing up the people: you don't want too much turkey."

Mike Parker: "I've talked with a lot of people about their impressions of the students we're getting here. And the general consensus is that we're getting some very highly intellectual students who are attracted to the school because of the Plan, because of the intellectual freedom. We're also getting some borderline, marginal students, who are coming here because they think they can get through and the school accepts them under the negotiated admissions policy. The general feeling is that we're not getting too many middle or average students. We're getting the high people and the low people, but we're losing the ones in the middle, the average people. And a lot of fraternity people say that this is the type of person that fraternities have attracted.

"In years past, I don't think we had the feeling on campus that there were so many marginal people around. I don't want to sound like an intellectual snob, but there is that feeling on campus, whether it's true or not. And it disturbs a lot of people that we're losing this middle stratum, if you want to call it that."

John van Alstyne: "Statistically, we're not. But the extremes are always more noticeable than the middle; and therefore if the class is larger, we have more that are at the top and more at the bottom, and immediately one tends to assume that this represents the whole class. He forgets the middle, and he's pretty nearly all wrong in doing so."

THUS IT SEEMS that a student today joins a fraternity because it represents a social pattern, a living pattern, that appeals to him. It offers a supportive group atmosphere that makes him feel at home. Because of changing housing patterns and needs, the fraternity is no longer necessary as a place to live. The student who joins a fraternity in 1974 does so because he wants to, not because he is forced into it by the lack of housing and the lack of other campus social activities. And because of this, today's fraternity members represent a more homogeneous and presumably more dedicated bunch of students than ever before, a group which is probably less diversified than any of their predecessors. In the short term, there are definite problems for the fraternity system and the individual houses; in the long run, this increased homogeneity may be the downfall of the system—or it may be its salvation. The fraternity leaders at WPI believe that the future is bright.

WPI

More Than Just Social Life?

ASK A fraternity member what he gets out of house life, and the odds are he'll tell you the fraternity has helped him come to terms with his own possibilities. We asked one.

Gary Balboni: "We're involved in every major activity on campus. It's the kick in the pants the house gives you. I know I couldn't ever have become as active as I am without those guys in the upper classes urging me on. I was the kind of guy who had it in me, but it wasn't going to come out without some help. The fraternity has given me a chance to realize my potential.

"Another thing about fraternities is that you're living in a structured group. WPI now has the Plan, and the Plan is a very individualized sort of education. They want individuals. You come here and you're not in a class any more; you're not in a group. You're by yourself, planning your own curriculum, your own course of study. In our civilization it's been proven that group living, one way or another, the family unit, is the best way. The family structure is what has carried us on over the years. And individuals can't make it on their own. I think fraternities can provide that structure, help round out an individual's life.

"The fraternity is a very responsible place to be. You consider it your home, not your dorm room or an apartment or something you can walk away from. We're all owners in this establishment we call fraternity. I'm going to care about this house until the day I die. I don't know if you could say the same thing about Ellsworth or Fuller or Daniels. I know guys who live in Daniels who throw knives into the doors. People just don't care about something they can walk away from, but they do care about fraternities.

"Finally, I feel very strongly that an individual's education, especially in an engineering school, has to enable him to deal with people. And I don't know of any courses I could ever have taken, even if I had a master's degree in business administration or psychology or sociology, that would have equipped me to deal with people as well as my three and a half years in the fraternity. The experience of being president, trying to make decisions for people – people you care about and don't want to hurt – is a tough thing to do. And it's tough with forty, never mind two thousand. I can really take my hat off to what this fraternity has done for me and a lot of other people ahead of me and behind me."

ON THE OTHER END of the academic log, there are more reservations. The two deans most involved with the implementation of the WPI Plan, and thus the future of Worcester Polytechnic Institute, are concerned about the impact of the fraternities on students.

William R. Grogan, dean of undergraduate studies: "I think that probably the greatest non-changers in the world are fraternity sophomores and fraternity alumni one year out. They really don't want to see anything changed from the way they saw it. I think this acts as a very deadly force.

"Fraternities have started, painfully, getting rid of the Gatsby-era image that has been so damaging to them. But it's up to the undergraduates. I don't see how anybody else can change their image. There has been a kind of fundamental anti-intellectualism that must be changed. As the college undertakes a much more challenging type of program, where the individual is really on his own to a much larger extent, the fraternities can make or break people much more easily. Any associations people get into can. A fraternity can be a tremendous support to anybody, but if the fraternities' total program – social events, athletics, and so on – does not help create a positive intellectual climate, then people are going to be in trouble. It's not just a matter of homework, but of encouraging people to be adventuresome and curious. We've started a little

study to see the types of projects that fraternity and non-fraternity people do. I'm not sure that it's going to show any significant differences, but we've had some tremendous activity on both sides. We've known before that people who are in fraternities never did all that badly under the old QPA grading system. We didn't find a great percentage of very top honors people there; it had a sort of median effect. But we just wonder whether that will happen as we get into opportunities for far more challenging intellectual activity. That worries me. The fraternity per se doesn't mean one thing or another; it depends on the attitude that develops within the system.

"In my farewell speech as national president of Phi Kappa Theta, I said that one of the things that can keep fraternities in the dark ages is their own attitude toward the type of things characterized by secret initiations. A pledge program well run is a very supportive thing for a fraternity. It can be a very fine experience. On the other hand, if it gets overdone by counting how many times people go to the house, or all kinds of other little things, then the whole process becomes untenable.

"For the last fifteen years I've heard about how much school spirit we would have if we didn't have fraternities. The implication is that fraternities by their nature obstruct school spirit. I don't think that's true at all.

"I think the problem of school spirit concerns everybody – fraternities, non-fraternity people, commuters. The problem is a basic sense of identification with the college. It's very hard for the fraternities to identify with the college when it has been a college with which it has been hard to identify on any basis at all. If you look at any number of areas, what is the central focus of the college? It certainly hasn't been our athletic teams. Maybe that's the answer – maybe if we had a winning basketball team up there on Saturday nights, WPI would mean something to people.

"I think the problem is typified by Kaven Hall and Atwater Kent. Our buildings are designed to face out, away from the campus rather than in. And this has been the mental attitude too. If the fraternities didn't exist, there still wouldn't be any more campus spirit; there would just be more people going home on weekends. There is something lacking at the core.

"WPI doesn't have the same ring to it that many other colleges, even in the city, have. Collectively, fraternity and non-fraternity people alike, we've got to work toward that identification. It's a very elusive thing; we haven't been able to catch it yet. We've got to be proud to identify with WPI."

John van Alstyne: "One reason why I was relieved to give up my position as advisor to the IFC relates to this. It wasn't anti-intellectualism. It was anti-interest in the college. I sometimes have the feeling that they're satellite campuses, and the only connection they have with the WPI up on the hill is the necessity to go up and take tests now and again. But the real sense of being an integral part of the college community is lacking, and that worries me terribly. It seems to me that it's part of the fact that we've forgotten what the central role of the fraternity should be.

"Fraternities were started with a great deal of idealism and somehow, in the process of expansion and solidification on campuses, they've lost a good deal of it. It seems to me that if we took a hard look at what the real purpose of a fraternity ought to be, wherein lies the real purpose of the system, if we aimed at that, then perhaps the system would again attract the kind of person that ought to be participating.

"Right now, I'm inclined to be in sympathy with the student who says I don't want to be in a fraternity because I haven't been convinced that the fraternities really have something to offer the student now. And I'm sorry about it. I think it's too bad."

Alexander Gordon, '36, treasurer of Alpha Epsilon Pi: "I can recall many years ago when I was here, some of us said that all this is a glorified trade school. What was lacking? I'm not sure.

"Certainly there were all kinds of efforts made to build up campus spirit. I think many of us felt that much of the problem perhaps stemmed from the fact that this was a technical school – just the very nature of the program, the almost complete lack of humanities. Always busy with numbers and trying to study for the quiz at eight o'clock the next morning . . . this created a much more difficult atmosphere than in the typical liberal arts college. Not to say that one way is all right and the other is all wrong, but there was some of that feeling. Perhaps some of it still exists today. I think the steps that have been taken, the new WPI Plan, the general type of curricula which have put a lot more of the humanities in the program, can go a long ways toward changing the attitude a student has toward WPI. At least I hope so."

FRATERNITIES
AS HOMEOWNERS

Landlord and Taxpayer

WHATEVER ELSE they may be or do, fraternities here and elsewhere are inescapably identified with *the house.* Fraternities own houses, and fraternity members live in those houses. In their capacity as homeowners, fraternities have two problems: First, they must compete with WPI-owned housing. Second, they must pay taxes.

Balancing the budget is a difficult feat for all homeowners in these days of rising taxes, skyrocketing heating and maintenance costs, and general inflation. The fraternities face all these problems, of course, but there are a couple of added twists. Unless the fraternities are competitive with the dormitory system, with comparable charges for room and board, they cannot be economically viable and would inescapably become an elitist group of wealthier students. So there is an external constraint on what they can charge. During the 1973-74 year, fraternity charges averaged about $1,200, compared with $1,175 for dormitory rates. One big difference, though, is that WPI, as a not-for-profit educational institution, *does not* pay taxes. Phi Gamma Delta, for instance, paid $8,000 in property taxes last year. With 40 members living in the house, that is $200 a year in property taxes that *each person* must pay for the privilege of living in the fraternity house. And that, in turn, means that the fraternity has $200 less per person to spend on maintenance of the house, on food, on necessary expenses. All this while the fraternities are housing some 25 percent of the student body. And they can't afford to keep the houses up.

Frances Harvey, '37, WPI trustee: "If we talk about a 2,000 student enrollment, the very planning of the school points out that we cannot furnish housing to the students with our own buildings. We then get to the point, one I've made many times, where I disagree with the philosophy we have around here for recruiting students. We print a nice fancy catalog. We tell them about the nice dormitories, and all of a sudden at the end of their freshman year they find out that they've got to live in a fire trap for the next three years because the school is not taking a position to supervise anything except its own buildings with respect to where we're forcing students to live.

"Around 1965, Phi Kappa Theta made a very thorough study when it was decided that the houses we had were wearing out. And we proved then, at 6 percent money and a tax rate half of what it is today, that it was an economic impossibility to build a house in modern design and to have it supportable by students who were living in it paying rates competitive with dorm room rents."

William Grogan: "If the college does not deign to assume any responsibility for the housing of students who are in fraternities, which it has not, then I think fraternities will be priced out of the business because of taxes, because of the inability to take care of their house. The cost of remodeling, as AEPi and Phi Gam have found, is atrocious, because there is not only the mortgage but also the incredible tax burden upon revaluation. This makes it really impossible now, I think, for a fraternity to seriously consider major construction or even very significant remodeling. I think that's a long-term thing, but it's going to catch up with the fraternities. The college has not taken the route of Carnegie Mellon University, Case Western Reserve University, and others, where the fraternities were made a part of the college-owned student-housing system, becoming in effect a special kind of dormitory. I think that unless that's done, it will only be a matter of time until we have a big fire, and *then* the college will act. But it's a shame we have to wait for that."

THE FRATERNITIES
AND THE COLLEGE

Official Viewpoints

I. STUDENT AFFAIRS: Cooperation and Responsibilty

by Donald P. Reutlinger, Dean of Student Affairs

Our fraternities supply many vital needs for nearly a quarter of our students. Many of the values of fraternity life are so individualized and personal that only fraternity members or alumni can fully appreciate this experience. However, it is obvious to all that fraternities can provide true brotherhood at their best and a choice of a style of living distinct from that of commuting, apartment-living or dormitory life. Fraternities are a social context in which much can be learned in the give and take of interpersonal relations, helping others, community service, self-reliant management of the house's own affairs, all within the camaraderie of a sense of belonging. For all of these reasons, our fraternity system is viable and well worth preserving.

However, there is a very real question as to how many fraternities can be supported when pledges must be drawn from a relatively small student body. Clearly we could not, for example, have so many fraternities as the University of Massachusetts in Amherst, which has about 18 with 800 members drawn from a student body five times larger than ours in its male population. We have had some 450 fraternity members in twelve fraternities this past year, a number that may shrink to eleven next year.

There also seems to be evidence that two of these eleven experienced light rushing last fall. An analogy may help to make our difficulty clear: Only a few of twelve competitors can hope to derive much satisfaction from a pie that can only be cut into 9 or 10 pieces. There are only two ways for us to create a larger pie: admit larger freshman classes or generate more interest in fraternity life among the freshmen we have.

Over the past seven years the student body has grown fairly rapidly from about 1500 to 2000 students, a level at which we anticipate no increase. Freshman classes, the rushing pool, have been 469, 349, 638, 534, 607, 562 and 565. The percentage of freshmen joining fraternities has been, respectively, 66%, 67%, 47%, 42%, 38%, 36%, and 33%. (A poll of our freshmen prior to rushing indicated that 31% would join fraternities; nationally we compare well with the figure of 17%, which has also been dropping

in recent years.) It can readily be seen that fraternities are not so popular as they were even a half dozen years ago, yet some changes in rushing, worked out with the IFC and the Office of Student Affairs, seemed last fall to stem the ebb tide. In essence, there was much greater cooperation among fraternities which have traditionally been competitors rather than cooperators. The fraternity system as a system was strengthened. It was as though they had realized that they must hang together to avoid hanging separately.

It was very gratifying for me to work with the IFC, supplying an early mailing list of the freshman class, going over copy of a mailing to parents, calling attention to the values of fraternity life in my annual letter to all incoming freshmen, and suggesting successfully that all fraternities rush first in the dorms and not sit back any longer and simply wait for freshmen to visit the houses each fall.

Yet, in stemming the falling tide, it still becomes apparent that there *must* be about 220 new freshmen interested in joining fraternities each year, and each fraternity *must* get its fair share of these pledges. (A smaller admitted freshman class would be ominous.) Otherwise, some houses will continue to be in financial danger, and one or two more might fail until the number of houses declines to a point where a viable fraternity system reaches its level of survival strength.

The fraternity system as a system was strengthened. It was as though they had realized that they must hang together to avoid hanging separately.

Independence, maturity, freedom, individual responsibility and the right kind of peer group influence are, I think, what fraternity life can foster at its best.

But all of this is to speak only of the problem of numbers. The numbers of pledges and even current brothers could fall as a result of students feeling that fraternity life is trivial or unimportant or detrimental to student life.

Last fall, after the tradition of fraternity-Becker house "raids" had gotten out of hand to the point where much damage and at least one assault had taken place, I wrote a strongly worded letter to all our fraternities. I ended this letter by saying that "Our fraternities, instead of remaining male bastions with a locker-room mentality, could aid in this process of growing up." Needless to say I did not enjoy making such an observation, and many fraternity members took offense, to say the least. Some also thought that this letter signaled some kind of abandonment of interest in fraternities by WPI. Far from it; I would not have written such a strongly worded letter if I did not care. And when I said that I thought that direct financial subsidy of fraternities by WPI was inappropriate, I was speaking only of one kind of help, loans and subsidies. Further, when I told WPI Police not to protect students from the Worcester Police, I was only affirming the ordinary sense of responsibility which all citizens must have including, now, eighteen year olds. Independence, maturity, freedom, individual responsibility and the right kinds of peer group influence are, I think, what fraternity life can foster at its best. I want to see our fraternity system strong and functioning at its best. Then the fraternities will serve a vital educational role in life at WPI where our goals depend so much upon educating future graduates for lives of social responsibility.

II. PLANNING: An Alternative Lifestyle

by Gardner T. Pierce, Director of Physical Planning and Plant Services

I view the fraternities as an optional social area that is very important to the college life – or at least to certain elements on campus. There are students who prefer fraternity life and fraternity social events, and certainly those are different from what these students would experience living on campus or living off campus in a room or an apartment house. This is what we've attempted to do, to provide diversity. You can't satisfy everyone with one set of circumstances. So we try to develop alternatives. This is one of the reasons for the type of housing we chose for the Ellsworth and Fuller dormitories we just finished building. An alternative to what we already had.

So first of all I view the fraternities as meeting a social need, for the overall benefit of the college. And then, down the list, they meet a housing requirement. They are filling somewhere between 400 and 450 beds, and that's a major part of our housing needs.

We have no more plans for building additional student housing. If, for some reason, the fraternities find they are not able to continue accommodating these 400 to 450 students, then the college will have to consider how to house them. If the fraternities drop down much below their present level, then the college will have to take some sort of action – either operate their houses, or other houses, or develop some other form of housing.

But my own personal feeling is that the fraternities ought to remain a very viable and interesting aspect of the total college life.

You can't satisfy everyone with one set of circumstances. So we try to develop alternatives.

III. FINANCES: Taxes, Mortgages, and What Constitutes a Dormitory?

by David E. Lloyd, Vice President for Business Affairs

A few years ago, after an intensive study, we worked with the Worcester tax assessor's office in developing real estate tax abatements for the renovated or newly built fraternities that were high on the real estate tax assessment list. These were Phi Gamma Delta, Theta Chi, Lambda Chi Alpha and Alpha Epsilon Pi.

Tax abatements were granted for these fraternities, but this did not solve all of their financial problems. Lambda Chi Alpha, for example, became periodically delinquent in their mortgage payments and their real estate tax payments were dropping behind. They also were having difficulty paying some of their operating bills. So, as an experiment, WPI developed a general agreement with the Cluverius Society under which, in essence, WPI took over ownership of mortgaged fraternity properties and rented the rooms to the students, thus turning these buildings into dormitories. As the first experiment WPI took over the Lambda Chi Alpha property by a legal arrangement called in lieu foreclosure.

Shortly after this it became evident that the Delta Sigma Tau fraternity members would have to move from their house on Trowbridge Road to make way for construction of the Ellsworth and Fuller dormitories. WPI had just purchased a house on 8 Boynton Street and we worked out the same arrangement with Delta Sigma Tau as we had with Lambda Chi Alpha. The College financed the reconstruction (with the students assisting the contractor and doing much of the planning and some work). That property became tax exempt because it also was developed into a dormitory.

I had misgivings frankly about this latter action, anticipating, I suppose, some of the problems that were developing with the whole tax base in Worcester. With our action on Lambda Chi the city assessor's office agreed that 12 Boynton Street would indeed become a college dormitory and thus was tax exempt. The forty people living there just happened to be Lambda Chis and they were no different from forty other students who might be living in a section of Stoddard. There is a difference, perhaps, but technically and legally the arrangement seemed to be all right.

If a fraternity could not carry its own operation, both financially and otherwise, there had to be problems beyond just the tax base.

In any event, we followed the same procedure with Delta Sigma Tau. When 8 Boynton Street was removed from the tax rolls, however, we tried to alleviate future problems somewhat by indicating that WPI would no longer take over titles of fraternities by in lieu foreclosure. If a fraternity could not carry its own operation, both financially and otherwise, there had to be problems beyond just the tax base that were making the operations financially and socially difficult.

Lambda Chi Alpha continued with some financial problems even though they had their entire tax burden removed. However, they are now getting along reasonably well with the help of dedicated leadership.

Now the problem is, what do we do in the future? Theta Chi fraternity was showing evidence of financial problems and hoped for an in lieu foreclosure arrangement. We had to tell them that this was impossible. We would try to help them with their problems, but if they wanted to retain all of the elements of the so-called fraternity independence, they were on their own. There is no way that WPI could take over their property as had been done with the other two houses.

The city tax assessment revaluation was developing and the word came to us that WPI could quite likely end up being taxed on all of its dormitories. It was made perfectly clear that the former "tax dodge" was not tolerable. I could not disagree with this honest philosophy.

And there are more problems, AEPi is financially almost bankrupt. The alumni leadership came to us a year ago and quite honestly stated that their problems were insurmountable, particularly with the tax burden. We agreed to wait until this past fall, to see what would happen in the rush period. Matters deteriorated even more. Now we have gone a whole year with no mortgage payments, they are in arrears in property tax payments and have many other debts. It's impossible for them to pull out of their financial dilemma operationally.

After studying all of the possible options, the Trustee Finance and Investment Committee decided that the best and fairest course of action, in the best interests of both AEPi and WPI, was to foreclose on the mortgage which WPI holds.

Now, either AEPi will find a buyer for the house at a sufficient price and clear up the financial situation that way, or there will be a public auction in a few months. At that point WPI or any other interested bidder has a right to bid and acquire all rights to the property providing the deed and title are clear.

It's a shame that things have developed this way. The idea, which was formulated into a policy, of WPI granting fraternity mortgages began early in the 1960's, and it was sound then. It was designed to help the fraternities upgrade their facilities. But it seems to have created some problems now. Times change.

THE WPI FRATERNITIES

The Houses Today

FRATERNITY: **Alpha Epsilon Pi**
ADDRESS: **39 Dean Street**
PHONE: **757-9927**
PRESIDENT: **Tom Carnevale**
NO. MEMBERS: **17**
NO. PLEDGES THIS YEAR: **8**
CAPACITY OF HOUSE: **40**
LIVING COSTS IN HOUSE: **$1,150**
LAST PROPERTY TAX BILL: **$9,000**
SPECIAL PROBLEMS: **money**

FRATERNITY: **Alpha Tau Omega**
ADDRESS: **10 Regent Street**
PHONE: **756-5656**
PRESIDENT: **Peter Arcoma**
NO. MEMBERS: **72**
NO. PLEDGES THIS YEAR: **18**
CAPACITY OF HOUSE: **43**
LIVING COSTS IN HOUSE: **$1,100**
HOUSE OWNER: **ATΩ Alumni Association**

FRATERNITY: **Delta Sigma Tau**
ADDRESS: **8 Boynton Street**
PHONE: **755-4139**
PRESIDENT: **Robert J. Byron**
NO. MEMBERS: **37**
NO. PLEDGES THIS YEAR: **17**
CAPACITY OF HOUSE: **21**
LIVING COSTS IN HOUSE: **$1,075**
HOUSE OWNER: **WPI**

FRATERNITY: **Lambda Chi Alpha**
ADDRESS: **12 Boynton Street**
PHONE: **791-6066**
PRESIDENT: **Mark R. Cosenza**
NO. MEMBERS: **58**
NO. PLEDGES THIS YEAR: **16**
CAPACITY OF HOUSE: **45**
LIVING COSTS IN HOUSE: **$1,290**
HOUSE OWNER: **WPI**
SPECIAL DISTINCTIONS: **28 waterbeds at last count (highest number on campus); boa constrictor lived in house during A and B terms (!)**

FRATERNITY: **Phi Gamma Delta**
ADDRESS: **99 Salisbury Street**
PHONE: **752-9581**
PRESIDENT: **James D. Aceto, Jr.**
NO. MEMBERS: **63**
NO. PLEDGES THIS YEAR: **20**
CAPACITY OF HOUSE: **40**
LIVING COSTS IN HOUSE: **Comparable to dorms**
HOUSE OWNER: **F. A. Morse Corp.**
LAST PROPERTY TAX BILL: **$8,000**

FRATERNITY: **Phi Kappa Theta**
ADDRESS: **26 Institute Road**
PHONE: **757-9971**
PRESIDENT: **Richard Newhouse**
NO. MEMBERS: **90**
NO. PLEDGES THIS YEAR: **32**
CAPACITY OF HOUSE: **55**
LIVING COSTS IN HOUSE: **$1,200**
OWNER OF HOUSE: **Aquinas Association**
CAMPUS STEREOTYPE: **Jocks**
SPECIAL DISTINCTION: **Winner of 1973 Founder's Cup Award for being best PKT chapter of 65 in the country.**

FRATERNITY: **Phi Sigma Kappa**
ADDRESS: **11 Dean Street**
PHONE: **752-9483**
PRESIDENT: **Robert Brennan**
NO. MEMBERS: **52**
NO. PLEDGES THIS YEAR: **28**
CAPACITY OF HOUSE: **50**
LIVING COSTS IN HOUSE: **$1,200**
HOUSE OWNER: **Kappa Xi Alpha Corp.**

FRATERNITY: **Sigma Alpha Epsilon**
ADDRESS: **6 Humboldt Avenue**
PHONE: **752-9667**
PRESIDENT: **Jeffrey H. Moody**
NO. MEMBERS: **36**
NO. PLEDGES THIS YEAR: **14**
CAPACITY OF HOUSE: **36**
LIVING COSTS IN HOUSE: **$1,200**
HOUSE OWNER: **Sigma Alpha Epsilon Corp.**

FRATERNITY: **Sigma Phi Epsilon**
ADDRESS: **11 Boynton Street**
PHONE: **798-3735**
PRESIDENT: **John J. Fitzgibbons**
NO. MEMBERS: **47**
NO. PLEDGES THIS YEAR: **16**
NO. NON-MEMBER BOARDERS: **3**
CAPACITY OF HOUSE: **48**
LIVING COSTS IN HOUSE: **$1,233**
HOUSE OWNER: **Alumni Board**
CAMPUS STEREOTYPE: **Jocks**

FRATERNITY: **Sigma Pi**
ADDRESS: **17 Dean Street**
PHONE: **757-9308**
PRESIDENT: **Mark W. Rockett**
NO. MEMBERS: **46**
NO. PLEDGES THIS YEAR: **15**
CAPACITY OF HOUSE: **35**
LIVING COSTS IN HOUSE: **$1,200**
HOUSE OWNER: **Psi Theta Nu Corp.**
LAST PROPERTY TAX BILL: **$1,800**

FRATERNITY: **Tau Kappa Epsilon**
ADDRESS: **1 Massachusetts Avenue**
PHONE: **757-9701**
PRESIDENT: **Richard Mariano**
NO. MEMBERS: **49**
NO. PLEDGES THIS YEAR: **23**
NO. NON-MEMBER BOARDERS: **3 English exchange students**
HOUSE OWNER: **Zeta-Mu Corp.**

FRATERNITY: **Theta Chi**
ADDRESS: **85 Salisbury Street**
PHONE: **753-9952**
PRESIDENT: **Eric E. Paulson**
NO. MEMBERS: **34**
NO. PLEDGES THIS YEAR: **3**
CAPACITY OF HOUSE: **56**
LIVING COSTS IN HOUSE: **$1,400**
HOUSE OWNER: **Epsilon Building Association**
LAST PROPERTY TAX BILL: **$10,000**
CAMPUS STEREOTYPE: **Joe Average**

Now you see it, now you don't

Color: That aspect of things that is caused by differing qualities of the light reflected or emitted by them. It may be defined in terms of the observer, or of the light.

Most of us are intuitively aware of what color is, and if we're scientifically inclined we probably think of color in terms of different wavelengths of light. That's the second part of the definition above.

But there's another kind of color, related to the first part of the definition. It's called subjective color, and it involves the perception of color from black and white.

The most common means for producing subjective color is an old scientific curiosity called Benham's Top, a disc which is half solid black and half a series of black arcs (see the illustration). When this is rotated at approximately six revolutions per second, colors appear. If you cut out the disc here, mount it on a piece of cardboard for support, and spin it, you should observe the phenomenon. (If no motor is available, spin it by hand on the tip of a pencil.) When rotated in a clockwise direction, the colors red, green, and blue will appear in the inner, middle, and outermost arcs, respectively. Rotate the disc in the opposite direction and the red and blue will exchange positions. This phenomenon, known as the Provost-Fetchner-Benham effect, has been known for almost one hundred years; what causes it has not been known.

Now a WPI graduate and his faculty advisor think they have found the key to subjective color. Leonard Polizzotto, '70, first started work on Benham's Top as an undergraduate independent research project

with another student. Most of his time was spent creating new patterns to produce various subjective color sensations, trying to understand how the disc worked. One early result was the creation of a black and white movie film which yielded subjective color sensations from movie frames which were sequenced in the same pattern as the rotating disc.

After graduating, Lennie stayed on at WPI for graduate work in electrical engineering. He became interested in biomedical engineering and decided to do graduate research on human subjective color perception. Since that time he has worked with associate professor Robert Peura, '66, both while in school and later while working for AT&T-Long Lines and (currently) Polaroid (where, contrary to your expectations, he isn't involved with color at all, but rather with production).

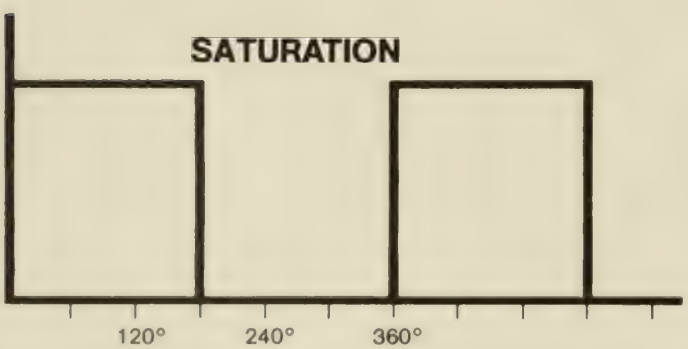
The outcome of this work was the presentation of papers at two international conferences (one in Goteborg, Sweden, in August 1972; the other in Dresden, East Germany, in August 1973) and one domestic conference. *Vision Research,* an international journal, has accepted a joint article by Peura and Polizzotto for publication.

SUBJECTIVE COLOR – HOW DOES IT WORK?

It appears from their research that subjective color is caused by intermittent visual stimuli, as opposed to real, or physical, color, which is caused by steady visual stimuli. In other words, the normal color that we see in everyday objects is not dependent on time variations, or the duration of lighting. But the sensation of color can be created by various flickering patterns of black and white.

If Benham's Top is producing color sensations, it must somehow be satisfying the three variables of physical color. These variables are **hue**, the gradation of color (e.g., red vis-à-vis green); **saturation**, the purity of the color, or its mixture with white (e.g., red vis-à-vis pink); and **intensity**, the amount of light (e.g., red vis-à-vis maroon). The problem was to determine how the color variables could be related to what happens on the disc.

By changing the arc length and/or position, the subjective color changes. When the disc is rotated backwards, for example, the red and blue change places. This obviously relates to hue. Polizzotto decided to analyze the disc according to an on-off (white-black) basis. Plotting the on-off pulses for the arc that gives the red sensation, taking the right side of the demarcation line between black and white as 0°, produces a waveform that is off for 60°, on for 120°, and off for 180°. The degree amounts are converted to time increments by the six-revolutions-per-second rotation. But you can flash a light on and off in the same time sequence, and no color sensation results. This one variable, obviously, isn't enough. We must need all three.



Between each arc is a pulse which is on for 180° and off for 180°. If this arc is removed, no subjective color appears, and therefore the presence of this pulse is required. Polizzotto termed this pulse saturation. The third variable, intensity, is merely the amount of light reflected from the disc. It need only be strong enough to exceed the energy threshold of the cones in the retina of the eye.

Now that he had isolated the color variables – or at least their analogues – on the disc, Polizzotto still was faced with the task of explaining how the hue and saturation waveforms produced the color sensations. Because the eye-brain path is a type of communication system, he used statistical communications theory, cross-correlation, to analyze the waveforms and compare the signals. This showed that each color waveform had a distinctive shape and time-shifts. Converting them to the frequency domain, each color has a distinctive phase angle. This implies that the color information is transmitted in the visual pathway by means of an angle-modulated system.

Applying this information to current theories of physical color vision (itself not completely understood by any means), has indicated a possible explanation for the subjective color perception. The retina of the eye contains receptors sensitive to long, middle, and short wavelengths of light (red, green, blue). These receptors, in turn, send information to color encoders, of which there are a red-green, a blue-yellow, and a black-white. (For purposes of simplification here, the various layers of cells in the retina – bipolar, amacrine, etc. – are lumped together under the general term encoder.) Since white light contains all colors of light, the light reflected from the rotating top stimulates all three receptors which send information to the black-white encoder. This encoder, in turn, sends information to the brain which is similar to the information sent by the color encoders when they are stimulated by physical color. The brain merely interprets the information it receives, regardless of source, as color. And this is how the black-and-white flickering is interpreted as color.

Because yellow light is a mixture of red and green light, Peura and Polizzotto reasoned that if their waveform analysis was correct, combining the waveforms for red and green should result in a new waveform representing an arc that yields yellow. And this was exactly the case. Similar work with the color orange yielded positive results, further confirming the validity of their method of analysis.

Peura and Polizzotto hope that their work may and their method of examining color may hold the key to a better understanding of just how the eye perceives color, and how the brain interprets it.

your class and others

The data on which these class notes are based had all been received by the Alumni Association before April 1, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI Journal.

1910

Class Secretary CHARLES E. BARNEY was hospitalized over the holidays, but still was able to send in the following news.

OLIVER JACOBS starts the New Year off with a bang, writing that he is looking forward to "seeing some of the gang in '75 and '80." For good measure he says, "Hooray for 1910." . . . LEONARD HOWELL recently flew to San Francisco to attend his grandson's wedding. Currently he is living at Foxwood Drive, Eastham, Mass. 02142. . . . ALVAN GROUT's address is Methodist House, St. Petersburg, Fla. He is enjoying his new location on the shores of Tampa Bay.

ED HANFF, after a stay in the hospital last summer, now feels as good as usual except for "usual old age." His wife, Tex, was also hospitalized but now "gets along O.K." . . . The GEORGE MARTINS of Westminster, Mass. were given a surprise 60th wedding anniversary party attended by 100 people last November. "Hap" is a little worried about joining the "Old Man's Club", but still went out and renewed his driving license for another four years. To date the Martin family stands at three children, 11 grandchildren, and "3 ½ plus" great-grandchildren.

IRVING and Clara PETERS are proud of their grandson who graduated from college last year. A good athlete (basketball), he was on the Dean's list all four years. Irving recently cracked his ribs in a fall, but is coming along better now. . . . PAUL and Marion TWISS have given up their car and weaving loom. Paul's main hobby now is his Hammond organ. . . . The MILLARD CLEMENTS are getting settled in their new home in Granby, Mass. right next to their son's family. . . . CARLYLE A. ATHERTON has returned from West Germany and is now residing at Sunny Acres Farm in Contoocook, N.H.

According to the secretary, "The Barneys are in 'Good condition for the shape they are in'." Charles is recovering from a successful operation and both he and Mildred are looking forward to future 1910 contacts. They wish to thank everyone who sent them class news over the holidays.

1915

During his retirement CHARLES B. HURD has been specializing in collecting fossil sea shells and is currently in charge of fossil shells at the South Florida Museum in Bradenton.

1926

The HAP WENDINS write that this has been a banner year as they have enjoyed trailer trips to Mexico, Texas, California, Oregon, and Nevada. At home in Mesa, Arizona, Hap teaches classes in Creative Imagination and Beginner Spanish. Also Hap was a group leader and Barbara an assistant librarian for a University of Buffalo extension course held at the University of California last summer.

1930

JOSEPH H. COGHILL reports that to date he has four daughters and nine grandchildren, five of them boys. . . . IRVING JOSEPH, who formerly owned Irving Joseph's Appliance Center in Worcester, is now retired and living in Ft. Lauderdale, Fla. . . . JOHN J. LYONS has been named district highway engineer (top administrative officer) for the District 3 division of the Massachusetts Department of Public Works. He joined the DPW in 1929 in the survey section. Later he became a district materials manager and director of the Division of Research and Materials. In 1972 he was appointed deputy chief engineer for maintenance, the post which he held prior to his latest promotion.

1931

ALBERT M. DEMONT, who recently retired as manager of professional manpower development for GE's corporate research and development operation, has been named acting director of cooperative and career placement at Schenectady (N.Y.) County Community College. His office is responsible for the placement of students in cooperative education jobs and of college graduates in permanent positions.

In 1932 he joined GE and spent many years in the naval ordnance department. Later he was associated with the company's general engineering laboratory as manager of program development and manager of employee relations. He is a course leader in GE's management practice course. In 1972 he was listed in "American Men and Women of Science."

JOHN E. FLETCHER retired in March. He had been a quality control engineer at Bryant Electric Co., division of Westinghouse, in Bridgeport, Connecticut.

1932

LESTER N. LINTNER is a special projects engineer at the Torrington (Conn.) Co. . . . CONSTANTINE ("Connie") J. ORFANOS, project manager, General Electric Co. (Electric Utility Equipment Projects), was recently elected president of the New York section of the Society of Harvard Engineers and Scientists. At the December meeting of the Harvard Club of New York, he introduced the guest speaker, Dr. Thomas O. Paine, a GE senior vice president of technology planning and development.

1935

KARL H. BOHAKER is director, business development, at AMF Incorporated (electrical products group), Alexandria, Va. . . . WENDELL D. JEWELL serves as a senior design engineer at Honeywell, Inc., St. Petersburg, Fla.

1936

ALLEN C. CHASE is president of Chase Pre-cast Corp. and CUPEC in North Brookfield, Mass. . . . WALTER G. DAHLSTROM retired January 1 from U.S. Steel Corp., Worcester Works, where he was division chief of Applied Research. . . . L. BREWSTER HOWARD currently serves as vice president of American Saw & Mfg. Co., East Longmeadow, Mass. . . . FRED HYATT works at Ewing Technical Design, Hicksville, N.Y.

1937

Presently GORDON F. CROWTHER is engineering personnel administrator at Factory Insurance Association, Hartford, Conn. . . . MORTON S. FINE of West Hartford, Conn., was recently named a director of Henry Souther Engineering Co. He serves as president of Morton S. Fine & Associates, Inc., Bloomfield, Conn. A registered engineer and land surveyor in Connecticut, Massachusetts, New York, New Jersey, and New Hampshire, he is also a registered landscape architect in Connecticut and Massachusetts and a registered planner in New Jersey.

1938

Dr. ARTHUR E. MARTELL has been appointed a distinguished professor in the chemistry department at Texas A & M University, College Station.

1939

WILDER R. CARSON has retired from the U.S. Army Munitions Command, Dover, N.J., and is now traveling throughout the U.S., Canada, and Mexico.

1940

CLYDE L. GERALD is with Chesapeake Instrument Corp., Glen Burnie, Md. . . . RUSSELL A. LOVELL, JR. is the author of a new book, *Thornton W. Burgess*, which includes many photos, genealogical charts, and maps of the areas which the young Burgess knew so well on Cape Cod. The book also contains an extensive insight into the man who later influenced millions of young readers. It is being published in conjunction with the town of Sandwich (Mass.) Thornton W. Burgess Centennial which is being celebrated this year. Mr. Lovell, who resides at 9 Jonathan Lane, Sandwich, Mass. 02563, is chairman of the Sandwich Historical Commission.

1941

CARL W. BETTCHER, JR., owner of the 50-man production machine shop, Van Dusen and Meyer, Inc., for eight years, has just moved into a new 30,000 square foot plant in Shelton, Conn. The Bettchers are the parents of two teenage daughters. . . . ALVIN A. LUCE currently serves as district sales manager at the Torrington Co., Torrington, Conn.

1942

PAUL C. DISARIO has been named director of the newly formed Industrial Division at Burns and Roe Inc., Paramus, N.J. Previously he was the chief construction and engineering executive responsible for projects involving laboratories, material handling facilities, and numerous types of process plants. . . . ERIC ESSEN was recently appointed a legislative-membership chairman for National Small Business Association, the Washington-based trade organization which represents 500 different types of industry and commerce. He is a director for General Business Services in the area of North Attleboro, Mansfield, Norton, and Easton, Mass. He has had over 20 years of experience in the management of local and nationally known corporations. . . . RUSSELL C. PROCTOR is project manager at Rust Engineering Co., Birmingham, Ala. . . . HOWARD C. WARREN, chief executive officer and chairman of the Riley Co., Skokie, Ill., and its subsidiary, Riley Stoker Corp., Worcester, became president of the company in January.

1943

HENRY C. DURICK, JR. has retired after 20 years with FMC Corp., Lakeland, Fla. He is now doing consulting work, a recent assignment taking him to Cyprus. . . . JOSE L. ZARAGOZA is currently a nuclear facilities development engineer with the Navy Department in Portsmouth, N.H.

1944

DAVID M. FIELD works as supervisor-airframes design for Boeing-Vertol Co., Philadelphia, Pa.

MORGAN
CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1945

HAROLD FLEIT has retired as vice president of marketing at Dorr-Oliver, Inc., Stamford, Conn.

1946

JOHN J. LANDERS is operations manager at Off-Track Betting Corp., New York City.

1949

JAMES M. GENSER serves as engineering manager at Processes Research, Inc., Cincinnati, Ohio.

1950

GEORGE E. ENGMAN is employed as a product support engineer at Digital Equipment Corp., Maynard, Mass. . . . Currently DAVID G. HUMPHREY works as a regional sales engineer at Sprague Meter Division of Textron in Bridgeport, Conn. He writes that he is involved with Natural Gas Utilities, and State and Federal Public Utilities Commissions in Pennsylvania, New Jersey, Delaware, Maryland, D.C., and Virginia. . . . ROBERT F. SHANNON has been named senior research engineer for the Central Research Department of Pfizer, Inc., Groton, Conn., a manufacturer of antibiotics, prescription drugs, and industrial chemicals. Formerly he was engineer in charge of design for Pfizer's central research pilot plant.

Munro, '51

1951

WILLIAM J. CUNNEEN has been appointed assistant chief control systems engineer at Stone & Webster. He will be responsible for computer systems and studies groups. Cunneen is District I vice president of the Instrument Society of America. . . . RICHARD E. HOWARD is manager of Winkfield Engineering Co., Inc., Medway, Mass. . . . DUNCAN W. MUNRO was recently elected secretary of the American Cemetery Association (ACA). He has served as a director of ACA, written extensively for the association's journal, and served as program chairman of the 1972 ACA conference in Martinique, F.W.I. Since 1967 he has been superintendent of historic Mount Auburn Cemetery in Cambridge, Mass. . . . ROGER E. WYE is vice president, program management, at Amecom Division/Litton Industries, College Park, Maryland.

Wyman-Gordon is the country's outstanding producer of forged components for America's key industries. Wyman-Gordon has supplied forgings for virtually every aircraft in the skies today, as well as for the Saturn and other space boosters. Equally important is its production of vital components for nuclear and turbine power plants, sea and undersea vessels, trucks, tractors and construction equipment.

Research is a hallmark of Wyman-Gordon; its Research and Development teams have long been recognized as industry leaders in the development of new techniques for advanced materials such as titanium and other space-age alloys.

WG

WYMAN - GORDON

1952

ROBERT A. MEYER is now a senior group engineer at Martin Marietta Corp., Orlando, Florida.

1953

SIDNEY R. HARVEY has been named technical service manager for the Elastomers and Polymer Additives Department of American Cyanamid Co., Bound Brook, N.J. He will be responsible for technical service in rubber chemicals, Factice, specialty elastomers and plastics additives. . . . ROBERT J. HASNERL is now an engineering project manager for Bendix Corp. in Newport News, Va. . . . CHARLES E. HORNE works as a senior product engineer at the Torrington (Conn.) Co. . . . GEORGE L. ROUSSEAU, SIM, has been appointed vice president of freight car engineering for the Pullman Standard Division of Pullman, Inc. He joined the firm in 1940 and previously served as a director of freight car engineering.

1957

Presently ALLAN T. DEVAULT serves as director of standard products at General Automation, Inc., Anaheim, Calif. . . . PASCAL A. MANCINI was recently promoted to manufacturing manager of the Industrial Chemical Division of Stauffer Chemical Co. at the firm's corporate office in Westport, Conn.

1958

DR. DAVID S. CRIMMINS is currently a full-time student at the University of Pennsylvania School of Dental Medicine participating in a 24-month pilot program to get people with PhD's trained as dentists. . . . BRUCE B. STORMS is a stockbroker with Kidder, Peabody & Co., Inc., New York City. He is also a partner in Storms Harvey Equipment Co.

1959

RONALD L. MERRILL serves as a project engineer at Minnesota Mining & Mfg. Co. (3M), St. Paul, Minn. . . . NEIL A. M. PETERS is a self-employed consultant in Phoenix, Arizona.

1960

JAMES R. BUCHANAN holds the position of New York district manager at Shell Chemical Co., Stamford, Conn. . . . DR. JOEL I. LEONARD is now a senior biomedical research engineer with General Electric in Houston, Texas. He has been working with NASA on bioengineering analysis of physiological control systems and Skylab medical experiments. Last year he designed and built an ecological, self-sufficient house. . . . RONALD F. POKRAKA serves as regional sales manager at Fibreboard Corp., Englewood Cliffs, N.J. . . . DR. HOWARD A. SHOLL, who is an assistant professor at the University of Connecticut, is currently on leave at the University of Edinburgh in Scotland for the 1973-74 academic year. . . . WILLIAM M. SPRY works as senior engineer at Digital Equipment Corp., Maynard, Mass.

1961

DANIEL D. GELLER is assistant Washington metropolitan coordinator at the U.S. Environmental Protection Agency in Arlington, Va. . . . GARO PAPAZIAN works at Digital Equipment Corp., Maynard, Mass. . . . STEPHEN D. TRITTER is principal programmer at Digital Equipment Corp., Maynard, Mass.

1962

JORGE H. CARVAJAL is now Subdirector Estudios Tecnicos at Carvajal & Cia, Colombia. . . . Presently WILLIAM J. SHEPHERD works at McGraw-Hill, Inc., New York City. . . . PHILIP DeCAPRIO was recently elected a legislative council member (6th district) in Hamden, Conn. He is an electrical engineer with the Northeast Utilities Service Co. and also serves as vice president of the Dunbar Hill PTA. He is a professional engineer in the state of Connecticut. . . . PETER J. MARTIN is the general manager, J. Derenzo Co., Needham, Mass.

1963

DR. ANTHONY E. ALLEGREZZA, JR. has joined the materials research and consulting firm of FRL (an Albany International company) as a senior research associate. At FRL in Dedham, Mass., he will be active in the development of hollow-fiber filter systems for industrial water-pollution control and water desalination processes. Formerly he was doing postdoctoral work at the University of Wisconsin and also was affiliated with duPont's Film Department at Buffalo, N.Y. He is a member of VITA (Volunteers in Technical Assistance), an organization which helps the developing countries of the free world. . . . JOSEPH BELLOFATTO serves as a staff engineer at Itek Corp., Lexington, Mass. . . . THOMAS CECHILE is a senior structural engineer at Gilbert Associates, Inc., Reading, Pa. . . . ROBERT S. CURRY holds the position of service planning representative for IBM in Rochester, Minn.

RUSSELL E. HOKANSON is currently a shift supervisor at E. I. duPont de Nemours in Aiken, S.C. . . . RONALD E. LEMANSKY has been promoted to manufacturing manager—precision and specialty products, of the Fafnir Bearing Company, New Britain, Conn. He joined the company in 1963 and for the last four years has served as superintendent of the Super Precision Bearing Division. . . . JOSEPH MANCUSO, head of the Management Engineering Department at WPI, has written a new book, *Fun and Guts: the Entrepreneur's Philosophy*, which was recently published by Addison-Wesley Publishing Company, Inc. Mancuso has served as director of eight small businesses and as a consultant for over 300 companies in the past seven years. . . . National Life Insurance Co., Montpelier, Vt., employs DR. WILLIAM J. SAVOLA, JR. as a security analyst. . . . KEIVAN TOWFIGH is now president of his own manufacturing company, the Rangine Corporation, West Medford, Mass. His firm deals with aluminum shelving and extruded aluminum devices. Previously he was on the faculty of Tufts University and an employe of Hewlett-Packard in Medford.

Anyone interested in viewing an exciting Super-8 color motion picture film starring JOE MANCUSO, BILL ZINNO, DON ROBERTSON, ROBERT MAYNARD, RICHARD IACOBUCCI, CHARLES GODDARD, JOHN GEFFKEN, JAMES KELLY, JOHN LAWSON, BILL NEWHALL, KENNY BACKER, JOHN SISTARE, MARCEL CLAVIEN, and many other classmates and spouses should contact Dr. RICHARD IACOBUCCI at Roctronics Entertainment Lighting, Inc., 22 Wendell St., Cambridge, Mass. 02138. For $3 the film will be lent to any classmate who wishes to see this never-to-be-forgotten silent classic of the 10th Reunion of the Class of 1963. A tour of the campus showing the new library, auditorium, and science building plus scenes of Lincoln Square and the new City Hall Plaza are also included in the 20-minute film.

1964

FREDERICK O. BORGESON is a senior engineer at Raytheon Co., Wayland, Mass. . . . DR. VICTOR S. DOLAT was a co-author of "L-band reflective-array compressor with a compression ratio of 5120," which was used as a reference for the article "SAW Technology" (Surface Acoustic Waves) which appeared in the Dec./Jan. '74 issue of *Microwave Systems News*. . . . Presently PETER R. FENNER serves as applications marketing manager at Systems Engineering Labs, Ft. Lauderdale, Fla. . . . DAVID L. GENDRON is production supervisor at Monsanto Co., Indian Orchard, Mass.

1974 ENGINEERING GRADUATES

Set yourself down where the living is great, too.

Naturally, when you settle down to a career, you want to do it where you'll also enjoy living. That's Sikorsky in Stratford, Connecticut, home of the famous American Shakespeare Festival, set amid woody, hilly country near Long Island Sound, within easy access of New York City.

And naturally, you want to be where your long-term career prospects are excellent. That's Sikorsky too. We're in the forefront of advanced technology for VTOL (Vertical Take-Off & Landing) aircraft, at a time when these remarkable craft are being increasingly utilized commercially—in construction, short-haul transportation, exploration, film making, firefighting, traffic control and other areas.

Yes, VTOL technology is definitely a field of the future —yours, if you like. At Sikorsky you'll enjoy a stimulating professional environment where your ability is encouraged, recognized and rewarded, where your career can really take off.

We're now offering opportunities—at highly competitive starting salaries and excellent benefits—for Aeronautical, Mechanical and Electrical engineers in the following areas:

DESIGN (aircraft structures; propulsion systems; transmissions; rotor, hydraulic & flight control systems; electrical/electronic systems).

TEST AND ANALYSIS (structural, loads, dynamic, stress, mass properties, reliability/maintainability; electrical/electronic systems; technical computing).

MANUFACTURING ENGINEERING (planning, methods, processes).

For further information, see your Placement Office for our brochure and the date of our forthcoming campus interviews. Or write directly to Mr. Leo J. Shalvoy, Professional Placement.

Sikorsky Aircraft

DIVISION OF UNITED AIRCRAFT CORP.

STRATFORD, CONNECTICUT 06602

An Equal Opportunity Employer M & F

F. CLARK GESSWEIN holds the position of communications specialist at the Army Warrentown (Va.) Training Center. Last summer he returned from Manila after spending three years there with the Diplomatic Telecommunications Service which was headquartered at the American Embassy. . . . GARY GOSHGARIAN, who teaches science fiction at Northeastern University, Boston, was a speaker at Technicon II, a science-fiction convention held at WPI during Intersession.

TERRANCE B. HARRIS serves as a senior field sales engineer for Union Carbide Corp., Molecular Sieve Dept., Tulsa, Oklahoma. . . . ROBERT E. MOURNIGHAN received his MS in chemical engineering from the University of Akron in December. . . . BRIAN SINDER is now project manager at Fairfield (Conn.) University. . . . PAUL B. WATSON is studying law at the University of Maine in Portland.

1965

Married: PETER D. CHRISTENSEN and Miss Lorraine Irene Morang on December 15, 1973 in Gorham, Maine. The bride is a graduate of the University of Maine. Her husband teaches mathematics at Lake Region High School, Naples, Me.

PETER J. BOWES works for Huron Cement Co., Southfield, Mich. as a masonry representative for northeast Ohio. . . . CHARLES J. DeSIMONE has been promoted to corporate banking officer in the Hartford Corporate Department of the Hartford (Conn.) National Bank and Trust. He went to HNB in 1972 from the Hamilton Standard Division of UAC, where he had been a chemical engineer. He has an MBA in finance from the University of Hartford. . . . WILLIAM R. JAMESON is a production design engineer for Ford Motor Co. . . . WILLIAM A. JOBERT works as general foreman at the Torrington (Conn.) Co. . . . ROBERT J. KOST is now a field supervisor at Hartford Electric Light Co., Hartford, Conn. . . . TERRY TRACY works at RCA in Princeton, N.J. He recently received his master's degree from the University of Michigan.

1966

ROGER J. ARMATA is a methods supervisor at the Torrington Co. in Connecticut. . . . Digital Equipment Corp., Mountain View, Ca., employs DAVID M. BURWEN as a sales representative. . . . JOACHIM W. DZIALLAS serves as general manager for Carl Edelmann GMBH, Heidenheim, West Germany. . . . Currently CAMERON W. HYDE works as district sales engineer at the Torrington (Conn.) Co. . . . MICHAEL T. PORTANOVA is a market/product specialist at Digital Equipment Co., Maynard, Mass. . . . The Massachusetts Division of Water Pollution Control, Boston, employs FRANK P. ROBINSON as a senior sanitary engineer. . . . STUART R. ROSELLE is a resident engineer at Central Illinois Public Service in Newton, Illinois.

1967

Married: JOHN A. FACCA and Miss Jane Ann Conlon on December 22, 1973 in New Britain, Connecticut. The bride is attending New Britain General Hospital School of Nursing. Her husband works at Rowland Development Corp., Kensington, Conn. . . . HARRY J. VAILLETTE to Miss Judith Ann Cloutier last fall in Leominster, Massachusetts. Mrs. Vaillette graduated from Salter Secretarial School. The groom is employed by Vaillette Electric Co., Leominster.

Born: to Mr. and Mrs. WAYNE M. CHIAPPERINI their second child, Kristen Jan, on October 15, 1973. Wayne, who is resident engineer of the Water and Sewer Commission in Waterford, Conn., is currently in charge of a $6 million water program and proposed $30 million town sewer project.

EARL D. BERRY, SIM, was recently elected to the new position of vice president for administration of Woodbury & Co., Worcester. He had been assistant treasurer and director of customer relations. . . . CHARLES T. BLANCHARD has been promoted to engineering manager of the Pneumatic Ejector Division of CPC Engineering Corporation. In 1971 he started work at the company as a project engineer. . . . EDWARD J. BOTWICK, who recently received his Juris Doctor from the University of Connecticut Law School, has joined the law firm of King, DuBeau and Ryan in Rockville, Conn. He belongs to the Connecticut and American Bar Associations.

DeSimone, '65

DR. ROGER L. GARIEPY is a scientific systems analyst for Air Products and Chemicals, Inc., Allentown, Pa. . . . FRANK T. JODAITIS, the new administrator of the water and sewer department in Manchester, Conn., previously was with HUD in the Hartford area as a contract administrator. . . . ROBERT A. KENNEDY is a student at Northeastern University, Boston. . . . DHAVAL R. KIKANI works at Ford Motor Co., Dearborn, Mich. . . . ARVIND J. PATEL serves as a product design engineer at Ford Motor Co. Also at Ford is DINESH C. SHAH, who holds the post of product design engineer. . . . JOHN H. SOULLIERE has been appointed Northeastern District Sales Manager for Power Systems at the Foxboro (Mass.) Company. He joined the company in 1969 as a sales engineer and has specialized in power systems. From 1971 to 1973 he was field application specialist in the power division. He is currently based in the Boston regional office.

1968

Born: to Mr. and Mrs. JOHN S. MAZUR, a son, Jeremy Adam, on August 31, 1973. John is an applications engineer for Wallace & Tiernan in Belleville, N.J. . . . to Mr. and Mrs. DAVID H. RICE, a son, Jeffrey Stephen, on December 13, 1973. Rice is an information system staff member at Western Electric, Newark, N.J.

DONALD P. BERGSTROM has been promoted to area engineer for the Wilmington office of Dufresne-Henry Engineering Corp. in Vermont. . . . NORMAN E. BRUNELL, who works in the patent department of the Foxboro (Mass.) Company, passed the Massachusetts Bar Examination last November. . . . WILLIAM E. CATTERALL, JR. is a product design engineer at Ford Motor Co., Dearborn, Mich. . . . ROBERT V. GEMMER received his PhD April from Stanford University. He has accepted a position as Postdoctoral Research Associate in the Department of Chemistry at Johns Hopkins University, Baltimore, Md. . . . ROBERT J. HORANSKY has been appointed engineer in the Northeast Utilities engineering department's computer application section. Earlier he had been an assistant engineer in the same department. . . . MICHAEL A. DiPIERRO of Polyform Corporation has announced that the corporation has merged with Foam Engineering and that the new facilities are now at 69 Milk St., Westboro, Mass. Mike also runs Auto-Tech, Inc., a chain of do-it-yourself auto service centers. During Intersession in January, Auto-Tech hosted over a hundred WPI students enrolled in auto servicing courses, thanks to Mike.

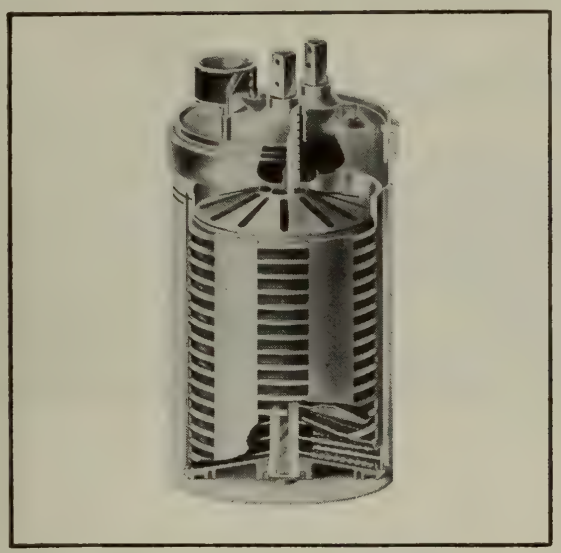
1969

Married: DANIEL C. POND to Miss Barbara M. Weller in Silver Spring, Maryland on November 17, 1973. Among the groomsmen were JAMES ATKINSON and BARRY SHIFFRIN. Mrs. Pond teaches in the Montgomery County school system in Maryland. Her husband is employed at the Johns Hopkins University Applied Physics Laboratory. . . . BERNARD WOOD and Miss Patricia Dussault in Oxford, Massachusetts on December 14, 1973. The bride is a licensed practical nurse. The groom is with Stone and Webster in Boston.

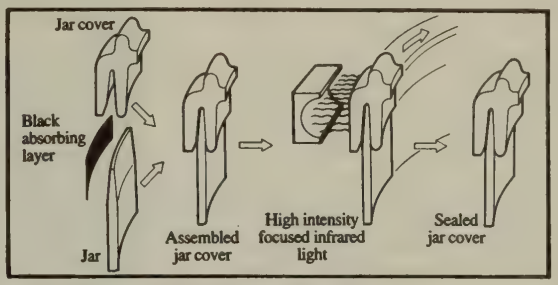
Born: Recently to Mr. and Mrs. JOHN HISCOCK a daughter, Lisa. Hiscock is chief engineer in the Second Water District in Norwalk, Conn.

FRANCIS P. ARCHAMBEAULT is an instructor at Worcester Junior/CNECT, Worcester. . . . ROGER C. DENNISON works as a project engineer at Hewlett-Packard, Waltham, Mass. . . . VALLABHDAS V. KANTESARIA works as a design engineer at Combustion Engineering, Inc., Windsor, Conn. . . . ROBERT E. NAJEMY, JR. teaches at Hawthorne House Day Care, Roxbury, Mass. . . . Currently GREGG POLLACK serves as district sales manager for Canon USA, Inc., Lake Success, N.Y. . . . ROBERT L. SIMONDS works at United Engineers, Inc., Boston. . . . JOHN S. THOMPSON, JR. is manager of Continental Investment Corp., Boston.

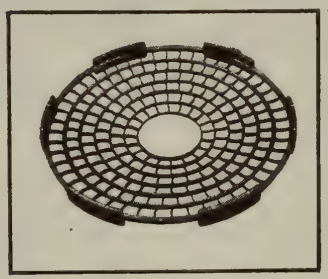
WESTERN ELECTRIC REPORTS



A cutaway view of the new lead-acid battery. For use in the Bell System, four types—each with a different ampere-hour capacity—will replace the 60 configurations currently in use over the same capacity range.



In the sealing process, focused infra-red light is absorbed in a carbon black coating at the jar-cover interface, causing localized melting of the plastic.



The positive grids are designed so that as corrosive growth occurs the space between hoops remains constant. Thus contact with the paste is maintained and electrical capacity actually increases with age as corrosion produces additional lead-dioxide material.

Developing a new lead-acid battery.

Every year, Bell System telephone companies spend over $30 million to buy and maintain the lead-acid batteries they use as intermediate sources of standby power during emergencies.

So they know just how susceptible all lead-acid batteries are to problems caused by corrosion. Problems such as gradual loss of capacity, short- circuits and cracking that could result in acid leaks and occasional fires.

That's why Bell Labs and Western Electric engineers recently undertook the first major improvements on what is essentially a 100-year-old design.

The result: a revolutionary, cylindrical lead-acid battery with a jar and cover fabricated from an improved flame-retardant, impact-resistant polyvinylchloride. The bond between jar and cover is leakproof due to a new infra-red sealing process.

Inside the battery are circular, cone-shaped grids cast of pure lead rather than a lead alloy, then stacked horizontally in a self-supporting structure. Positive grids are cast with large grain-size to minimize corrosion. They're then filled with a paste (tetra-basic lead sulfate) whose rod-like particles interlock for maximum mechanical stability.

These new features required new manufacturing techniques. For example, how could potential suppliers best mass-produce positive plates of the required grain-size and paste the grids rapidly and efficiently, given their conical shape and the new oxide material's crystal structure?

Western Electric's Purchased Product Engineering organization and Bell Labs set up a design capability line at a company subsidiary, Nassau Smelting & Refining.

Using machinery developed at Western Electric's Kearny Works, they refined production methods and materials that made it possible for a supplier to produce the new battery economically, in commercial quantities and to Bell System specifications.

And Western Electric plans to achieve still further savings through a continuing cost-reduction program.

Conclusion: Close cooperation between Bell Labs and Western Electric has resulted in the creation of a superior lead-acid battery. Its expected useful lifetime is at least 30 years—double that of even its best predecessors. It lowers maintenance costs substantially. And its unusual design virtually eliminates the hazard of fire due to mechanical failure.

Western Electric

We make things that bring people closer.

1970

Married: JOSEPH CASCIO, JR. and Miss Barbara E. Dow on December 29, 1973 in Falmouth, Maine. The bride graduated from the University of Maine. Her husband is employed by the Foxboro (Mass.) Company. . . . JOHN N. DUCIMO to Miss Sharron J. McCullough in Boston on November 17, 1973. Mrs. Ducimo is a nurse. The bridegroom is a sales and service representative for U.S. Steel Electric Cable in Worcester. . . . ROBERT G. MERRITT to Miss Mary F. Begg in Connecticut on January 12, 1974. Mrs. Merritt graduated from Southern Connecticut State College. Her husband is employed at Olson Mfg. Company, Holden, Mass. . . . BRUCE RUCKDESCHEL to Miss Deborah Lee Scott on November 9, 1973 in Westbrook, Connecticut. The groom is employed at CompuColor, Inc., in Stratford.

W. TODD AKIN works in the Data Processing Division at IBM in Worcester. . . . Lt. KENNETH C. BASSMANN is chief-communications/electronics operations with the U.S. Air Force in Takhli, Thailand. . . . GERRY BLODGETT serves as a patent agent with Norman S. Blodgett, Worcester. . . . DANIEL K. BREEN is a sales trainee at Warner Electric Brake & Clutch Co., Beloit, Wis. . . . Merck & Co., Inc., Danville, Pa., employs DONALD T. KREMER as a process supervisor. . . . PETER F. LALOR works at the Electric Boat Division of General Dynamics in Groton, Conn.

Lt. JEFFREY C. MANTY has been serving with the U.S. Army Ordnance Corps in West Germany as a shop officer and executive officer of a direct support maintenance company. In June he plans to return to the Bethlehem (Pa.) Steel Corporation as a production engineer. . . . KALVIN W. NGOON is a programmer at Syntex, Inc., Palo Alto, Calif. . . . JOHN P. OBER is studying at the London School of Economics in England. . . . GIRISH PATEL works at Bechtel Corp., Gaithersburg, Md. . . . GEORGE E. PHILIPPON serves as district representative at Nalco Chemical, Chicago, Ill. . . . Crowson Construction Co., Boise, Idaho, employs JOSEPH W. SHAW as superintendent. . . . LAWRENCE B. COHEN recently received his MA in chemistry from Boston University where he was a U.S. Office of Education Fellow from 1971-73. Currently he is an instructor of chemistry at B.U.

JOSEPH B. KAYE works as manager of City Cleaners, Inc., Springfield, Mass. . . . Currently STEPHEN P. KATZ is with Digital Equipment Corp., Westfield, Mass. . . . Presently DONALD C. MILIA serves as a sales engineer at the Torrington Co., Torrington, Conn. . . . JOHN H. READ is assistant structural engineer at Boston & Maine Corp., North Billerica, Mass. . . . MARSHALL H. SHEPARD is with Bowmar/ALI Inc., in Acton, Mass. . . . EDWARD C. LOWE, III has accepted a job with General Electric's sales office in Wellesley, Mass.

1971

Lt. DENNIS CHIN serves with the U.S. Army in Thailand. . . . WILLIAM E. HELLIWELL, JR. has been promoted to resident service engineer by Riley Stoker Corporation. He will be located in the firm's sales office in Denver, Colo. Formerly he was a field engineer at corporate headquarters in Worcester. . . . Presently ERNEST R. JOYAL works as a naval architect for the U.S. Navy, Supervisor of Shipbuilding, Groton, Conn. . . . BENJAMIN H. KATCOFF is now a compensation administrator in the Personnel Division at Polaroid Corp., Cambridge, Mass. He is also studying nights for his MBA at Boston University.

1972

Married: PAUL A. FRITZSCHE and Miss ANNE D. RODIER, '74, on January 19, 1974 in Oxford, Massachusetts. Mrs. Fritzsche received her BS in mathematics from WPI in February. She is a pension service coordinator for Union Mutual Insurance Co., Portland, Me. Her husband is a second year law student at the University of Maine School of Law in Portland. . . . JAMES L. JARDINE to Miss Elaine C. Fagerquist on September 22, 1973 in Worcester. Mrs. Jardine is a registered nurse. The groom is a project engineer for the State of Vermont Agency of Environmental Engineering in Montpelier. . . . DAVID A. MARTIN and Miss Kathleen Nestico on December 22, 1973 in Bristol, Connecticut. Mrs. Martin, a graduate of Hood College, is a teacher. Mr. Martin is a graduate student at Central Connecticut State College.

Married: BRIAN J. SAVILONIS to Miss Janice E. McNamara of Jefferson, Massachusetts on December 29, 1973. Recently Brian was a runner-up in ASME's Arthur L. Williston Medal-Charles T. Main Award Contest. His entry, which was concerned with the civic and cultural responsibilities of the engineer was titled "An Interim Pollution Abatement Method: Artificial Aeration." At present he is a doctoral candidate at the State University of New York at Buffalo. . . . Lt. DONALD A. TAFT to Miss Mary Ellen Biggins on January 5, 1974 in Worcester.

Mrs. Taft, who attended Framingham State College, is continuing her studies at the University of Maryland, College Park. Lt. Taft is a company executive officer with the 76th Engineer Battalion at Ft. Meade.

DANN DAVID is on the environmental and safety activities staff at Saab-Scania of America, Inc., Orange, Conn. . . . PETER E. DAUPERN serves as a project engineer at Cahn Engineers in New Haven, Conn. . . . PAUL W. KELLEY works at Digital Equipment Corp., Maynard, Mass. . . . ANTHONY J. MANGANO is with Polaroid Corp., Waltham, Mass. . . . KENNETH PRZYSTAS, who is employed at American Optical in Southbridge, Mass., is also the author of a new sports column, "Sports Beat," which currently appears in Webster's *SOUTH COUNTY ADVERTISER*. . . . MICHAEL C. TSIANCO is a teaching assistant at the University of Rochester (N.Y.).

jamesbury

manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves

Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

1973

Married: STEPHEN J. BAUM and Miss ELIZABETH KEEGAN of Cranston, Rhode Island on August 25, 1973. Mrs. Baum is a senior at WPI where her husband is a graduate student in the Civil Engineering Department. . . . PHILIP BRODEUR and Miss Rosemary P. Bailey on January 19, 1974 in Holyoke, Massachusetts. Mrs. Brodeur graduated from Bryant College, Smithfield, R.I. The groom is coordinator at Bailey Realty. . . . MARK D. ERASMUS and Miss Dianne M. Valas in Oxford, Massachusetts on December 22, 1973. The bride attended St. Vincent Hospital School of Nursing and Quinsigamond Community College, Worcester. Her husband is studying at the University of Connecticut School of Medicine in Farmington. . . . PETER R. PASTORE to Miss Heidi S. Klemme in Rowayton, Connecticut on November 24, 1973. Mrs. Pastore, a graduate of Garland Junior College, is presently assistant manager at the Corner House in Darien. The groom is with Metcalf & Eddy, New York City.

Born: to Mr. and Mrs. GEORGE R. HARRIS a son, Duncan Stuart, on December 1, 1973. George is with Towle Manufacturing Co. in Newburyport, Mass.

SURESH K. AMIN is a design engineer at the Entwistle Co., Hudson, Mass. . . . SALLY STOVOLD BARRY serves as a scientific programmer at MIT's Lincoln Laboratories, Lexington, Mass. . . . RICHARD B. BELMONTE works as a safety engineer trainee with the U.S. Army Materiel Command at the Red River Army Depot, Texarkana, Texas. . . . DR. HOWARD S. BILOFSKY is a senior applications scientist at Bolt, Beranek & Newman, Inc., Cambridge, Mass. . . . Honeywell Information Systems, Inc., Framingham, Mass. has employed TIMOTHY R. BROWN as a design engineer. . . . BILL CARTON, who coordinated the well-received Technicon I during Intersession last year, organized and spoke at Technicon II during this year's Intersession.

KATHLEEN COYLE works at Hamilton Standard, Windsor Locks, Conn. . . . KATHRYN ZAWISLAK DAGOSTINO is with the Prudential Insurance Co., Los Angeles, Calif. . . . DEBORAH LaPLANTE GOODWIN works for National Commercial Bank & Trust, Albany, N.Y. . . . JOSEPH A. KALINOWSKI is an industrial engineer at Norton Co., Worcester.

ROGER LAVALLEE teaches mathematics at Cathedral High School, Springfield, Mass. . . . TIN WAI MAH serves as a computer programmer at Digital Equipment Corporation, Maynard, Mass. . . . MARYANN BAGDIS PACE has been employed as a computer programmer at Philadelphia Electric Co., Philadelphia, Pa. . . . J. DIANE PRITCHARD is a self-employed programmer-consultant in East Greenwich, R.I. . . . KENNETH C. PULS teaches chemistry at Immaculate High School, Danbury, Conn. . . . WILLIAM A. RICHARDS works as a computer operator at Superior Electric Co., Bristol, Conn. . . . ROBERT SCHULTZ is a traveling secretary for Lambda Chi Alpha Fraternity, Indianapolis, Indiana. . . . ROBERT STARNES is a student at the University of Pennsylvania Medical School. . . . RICHARD H. TURNER serves as a sales consultant with Sales Consultants of Westboro (Mass.). . . . JOHN A. WILLIAMS, JR. works for Shell Chemical Co., Axis, Ala.

completed careers

JAMES G. GOODELL, '10, passed away at St. Clare's Hospital, Schenectady, New York last May.

He graduated as a mechanical engineer from WPI in 1910. He retired as engineer-inspector from Marsh & McLennan Insurance Agency in 1960 after 35 years of service.

AUGUST J. REINHARD, '12, of Katonah, New York, a retired project engineer from Western Union Telegraph Co., New York City, died last November.

He was born January 23, 1890 in New York City and graduated with a BS in electrical engineering from WPI. From 1912 until 1957 he was with Western Union.

Mr. Reinhard was a professional engineer in New York state.

HARRY B. LINDSAY, '13, a trustee emeritus of WPI, died January 27, 1974 in Holden, Massachusetts at the age of 84.

He was born in Hopkinton, N.Y. on December 17, 1889. In 1913 he graduated as an electrical engineer from WPI. An authority on abrasives, he retired in 1951 as secretary-treasurer of the Grinding Wheel Institute and of the Abrasive Grain Association.

During World War II, Mr. Lindsay was chairman of the Abrasive Council for War Production. Earlier, after a postgraduate year at WPI, he had served as an instructor in electrical engineering and Ordnance Optics at the U.S. Naval Academy, Annapolis, Md.

At the outbreak of World War I, he joined the Army and was in charge of the air services school for radio and control artillery fire at Ellington Field, Houston, Texas.

After the first World War, he worked as a sales engineer in the grinding wheel division at Norton Co., Worcester, and later became sales manager of the refractories and machine tool divisions. During his career he was also associated with Tuska Radio Mfg., Co., Hartford, Conn. In 1933 he became deputy administrator for the National Recovery Administration in Washington, D.C. and in 1934 he was named secretary-treasurer of the Grinding Wheel Manufacturers Association.

Mr. Lindsay, who was trustee of Worcester Mechanic Savings Bank and Home for Aged Women, was a past president of the WPI Alumni Association and the Worcester chapter of the Association. He belonged to Theta Chi, Tau Beta Pi, Sigma Xi, and Skull.

PAUL W. GLOVER, '14, died July 10, 1973 in Hanover, New Hampshire. He was 81.

A native of Woodsville, N.H., he later studied civil engineering at WPI. For many years he was treasurer of the Bath (N.H.) Fiber Co., Inc. Previously he was with Blandin & Glover.

Mr. Glover was a member of Phi Gamma Delta Fraternity and Skull.

ALFRED C. FENN, '17, died on December 3, 1973 in Clearwater, Florida.

He was born May 3, 1894 in Essex, Conn. After receiving his BSEE from WPI, he joined Riley Stoker Corporation in New York City. In 1959 he retired as a sales engineer after nearly 40 years of service. During World War II he worked as a $1.00 a year member of the Power Division of the War Production Board in Washington, D.C.

Mr. Fenn belonged to Theta Chi and ASME.

ALFRED M. WHITTEMORE, '19, died October 25, 1973 in Concord, New Hampshire.

He was born in Needham, Mass. on June 12, 1896 and later studied civil engineering at WPI. Early in his career he was employed by the New York Central Railroad in Galion, Ohio and Strauss Engineering Corporation in Chicago.

In 1962, after 27 years of service, he retired from the New Hampshire Department of Public Works and Highways where he had been assistant bridge engineer. He was a member of the original survey party on the famed scenic Kancamagus Highway in White Mountain National Forest.

He was a member of Sigma Phi Epsilon.

ROBERT G. FERGUSON, '21, former vice president of Teleregister Corp., New York City, died November 28, 1973 in Lake Worth, Florida. He was 74.

A native of Chicopee, Mass., he graduated as an electrical engineer from WPI in 1921. During his career he was associated with New York Edison, Brooklyn Edison, and Teleregister Corp., where in 1929 he became assistant to the vice president of engineering. He later retired as vice president of the corporation.

Mr. Ferguson was a member of ATO and Skull.

RICHARD P. PENFIELD, '21, passed away suddenly on January 6 in Portland, Connecticut at the age of 73.

He was born in Portland and in 1921 graduated as an electrical engineer from WPI. For fifty years he was an employe of the Hartford Electric Light Company. He also had served as secretary to the Board of Directors of the Middlesex Memorial Hospital and as chairman of the advisory board of the United Bank and Trust Company.

Mr. Penfield was a member of Phi Sigma Kappa and a charter member and past president of the Portland Exchange Club.

ULDERIC F. HURLEY, '22, died at his home in Southboro, Massachusetts on January 3, 1974.

He was born in Marlboro, Mass. on August 12, 1901. After studying at WPI he later joined the New England Telephone Co. where he was employed for 40 years.

Mr. Hurley, who was to have been general chairman of the 1974 Southboro Heart Fund Drive, was a blood courier for the American Red Cross, past president of Southboro Senior Citizens, treasurer of the Southboro Historical Society and a member of SAE. He was past president of the William Denver Chapter of the Pioneers of America and a member of the Southboro Housing Authority.

A long-time member of the Southboro Advisory Board and secretary of the local Historic Commission, he also served as an active member of FISH. In 1971 he was selected as the Southboro Rotary Club Man of the Year.

ROBERT H. ALBERTI, '26, of Greenfield, Massachusetts, died January 2, 1974 at the age of 69.

A native of Greenfield, he later earned his BSCE at WPI. He worked for the Water Department in Springfield, Mass.; the town of Greenfield as superintendent of streets; the Massachusetts Local Control Survey; the U.S. Dept. of Commerce; and the Massachusetts Geodetic Survey. In 1969 he retired as chief inspector and quality control manager at Greenfield Tap & Die.

A member of Theta Chi and Tau Beta Pi, Mr. Alberti also belonged to ASTME, the Franklin County Industrial Management Club, the American Ordnance Association, and ASQC.

W. SHELDON CHAPIN, '27, of Falmouth, Maine passed away on August 10, 1973.

He was born on May 22, 1905 at Lee, Mass. For many years he was the editor at Gannett Publishing Co., Portland, Maine.

Mr. Chapin belonged to Alpha Tau Omega.

BUELL S. DICKINSON, '27, of Granville, Massachusetts, died March 14, 1973.

. A Granville native, he was born on June 18, 1901. After studying mechanical engineering at WPI, he joined Wickwire Spencer Steel. Later he was with Walsh Holyoke Steam Baler, Holyoke Card & Paper Co., and American Abrasive Co., Westfield, Mass., where he was a plant superintendent.

He was a member of Sigma Phi Epsilon.

JAMES M. SIMMONS, '27, passed away on January 14, 1974 in Cleveland Heights, Ohio. He was 69 years old.

Born in New York City, he received his bachelor's degree from New York University in 1929 after studying civil engineering at WPI. In 1929 he joined the Erie Railroad in Cleveland (now Erie-Lackawanna R.R.), where in 1969 he retired as a designer in the Department of Structures after 40 years of service.

Mr. Simmons belonged to the Society of Engineers.

DONALD S. BLISS, '28, education specialist, died on December 1, 1973 at his home in Washington, D.C. He was 71.

A native of Washington, he graduated from WPI as an electrical engineer. In 1928 he joined the Bliss Electrical School, which had been founded by his father. He served as vice president of the school, which in 1950 was taken over by Montgomery Junior College. Later he became director of the Electronics Division at the U.S. Navy Training Publications Center in Washington. He retired in 1967.

Mr. Bliss belonged to ATO and was a former president of the Federal Schoolmen's Club and commodore of the Washington Yacht Club.

THOMAS G. BERGIN, '30, died December 26, 1973 in Elmira, New York while on a visit to his daughter, Mrs. Linda Gudas of Horseheads, N.Y. He was 65.

He was born in Swampscott, Mass. and later studied at WPI. Last June he retired as an engineer from the A.F. Holden Metallurgical Laboratories of Detroit, Michigan.

Mr. Bergin was the husband of Mrs. Doris Bergin, who was the secretary in the WPI Management-Engineering Department for many years.

WILLIAM R. HANNAH, '36, a comptroller at Massachusetts Mutual Life Insurance Co., Springfield, Mass., died December 31, 1973 in Massachusetts General Hospital, Boston, after undergoing open-heart surgery.

Mr. Hannah was born July 15, 1913 at Springfield and later became a student at WPI. In 1934 he became associated with Mass. Mutual's auditing department and was transferred to the accounting department in 1938. He was named supervisor in 1950, manager in 1953, and comptroller in 1956.

A World War II veteran, he also served on the Wilbraham (Mass.) Water Commission for 12 years. He belonged to Phi Sigma Kappa.

ANGELO V. MAURIELLO, '36, of Natick, Massachusetts passed away on November 1, 1973.

He was born on May 16, 1913 in Worcester. After studying at WPI, he joined the Massachusetts Department of Public Works. Later he served as a civil engineer in the U.S. Army Corps of Engineers in Boston.

Mr. Mauriello was a member of Phi Kappa Theta Fraternity.

JOHN FORD, JR., '42, of Piedmont, California, died December 20, 1973. He was 53.

Born in Plymouth, Mass., he earned his BSCE from WPI in 1942. During his career he was associated with Ben C. Gerwick, Inc.; Raymond International; Merritt-Chapman Scott; Pomeroy-Gerwick; and Peter Kiewit Sons Co. in California where he served as project superintendent.

Mr. Ford, who was a member of Phi Sigma Kappa and ASCE, was also a former vice president of the Northern California chapter of the Alumni Association.

DONALD E. FLOHR, '48, a civil engineer who designed fire protection systems for the U.S. Navy and Post Offices, died January 1, 1974 at his home in Arlington, Virginia.

He was born in Harrisburg, Pa. on August 29, 1924 and served on an aircraft carrier in the Navy in World War II. After graduating from WPI in 1948, he joined the Factory Insurance Association. In 1952 he became a civilian fire protection engineer for the Navy and helped design safety systems in the U.S., Europe, and Japan.

The Post Office Department hired him in 1968 to organize fire safety programs for post offices nationwide. In 1972 he returned to the Naval Facilities Engineering Command headquartered in Alexandria, Va.

Mr. Flohr, a professional engineer in Massachusetts, was a member of Lambda Chi Alpha, the Society of Fire Protection Engineers, and the National Fire Protection Association. He was a past secretary of the Washington, D.C. chapter of the Alumni Association.

JOHN F. BRIERLY, '50, founder and president of Valuation Counselors, Inc., Chicago, died suddenly November 30, 1973 in Glenview, Illinois. He was 48 years old.

A Worcester native, he graduated as a civil engineer from WPI. While at the Institute, he served as a respected president of his class and of his fraternity, Phi Sigma Kappa. He belonged to Skull and as a freshman was named the most outstanding member of his class.

While serving as a quartermaster third class with the Navy in World War II aboard the destroyer escort "Tabberer", he and other crew members were cited by Admiral William Halsey for rescuing 55 survivors from two typhoon-wrecked destroyers off Luzon in 1944.

Following graduation from WPI, he became a field representative for the Factory Insurance Association. Then he joined the American Appraisal Company. Prior to founding Valuation Counselors, Inc., he served as vice president in charge of the corporate marketing and sales department of Marshall & Stevens in Chicago.

Mr. Brierly was a special associate member of the Chicago Real Estate Board, an associate member of the National Association of Accountants, and a member of the Executives' Club of Chicago. He was vice president of the Union League Boys Club Foundation of Chicago. A past president of the Chicago chapter of the Alumni Association, Mr. Brierly also was very active in admissions work for WPI in the Chicago area.

CALVIN E. BACKSTROM, '61, died December 14, 1973 in Buffalo, New York at the age of 35.

He was born in Worcester and earned his BSEE at WPI. Following graduation he joined the Blackstone Valley Electric Co. in Lincoln, R.I. In 1968 he started work as supervising distribution engineer in the Electrical Division of the Department of Public Utilities in the city of Anaheim, Calif. Prior to his death he was utilities manager for the Penn Yan (N.Y.) Municipal Board.

Mr. Backstrom was a member of AIEE, the Western Underground Committee and Pacific Utilities Electric Service Requirements Coordinating Committee. Active in Boy Scout work, he was also a former president of the Jaycees in Rhode Island and served on the national Jaycees board for three years. He was the nephew of Richard W. Rhodes, '34.

LLOYD H. BOSTWICK, SIM '61, died December 28, 1973 in Nashua, New Hampshire. He was 57.

A Worcester native, Mr. Bostwick was a former vice president of Ball Valve Co., Worcester (now Smith Valve Co.) Later he was a purchasing agent for Lytron Co. in Woburn, Mass. At his death he was general manager of the National Pollution Control System in Nashua.

He was past president of the Worcester Lodge, National Association of Purchasing Management.

ROBERT W. SUHR, '65, a senior engineer at the Westinghouse Defense and Electronics Systems Center, Baltimore, Md., died at his home in Elkridge, Maryland on December 12, 1973. He was 33 years old.

Mr. Suhr, a native of Dover, N.J., graduated from Brown University in 1963 with a BS in arts and engineering. He received his MSME from WPI. Following graduation he was employed at the Westinghouse Aerospace Division at Friendship Airport in Baltimore.

His contributions to space technology included a dry drilling technique for soil sampling used on the Apollo lunar probe, a deployable boom antenna for the Environmental Technology Satellite, and work on the television cameras for the current Skylab mission.

He was a member of the American Society of Mechanical Engineers.

WAYNE Y. MORSE, '69, died as a result of a mountain-climbing accident in Woodland Hills, California on December 23, 1973.

He was born in Worcester on July 26, 1947 and graduated as a mechanical engineer from WPI in 1969. For the past four years he had worked at Rocketdyne Division of North American Rockwell in Los Angeles.

He was a member of ASME and the Sierra Club of California and was the brother of Robert H. Morse, '64.

J. PAUL NESSLER, '71, died on October 20, 1973 in Dearborn, Michigan.

Born in Pittsfield, Mass. on December 21, 1946, he later attended Clarkson. In 1971 he received his MSME from WPI.

At the time of his death he was a production design engineer at Ford Motor Co. in Dearborn.

When it comes to construction products, your Clipper Dealer can color your thinking

For 35 years Clipper has been painting their construction products orange.

It could have been green or purple or any other color. But they picked orange. Of course the rest is history.

Today that bright orange color is known throughout the construction world for quality, efficiency and precision-engineering.

Just as your Local Clipper Dealer is known for dependable service, efficiency and integrity.

He can help you select from any of the many fine Clipper construction products. Including concrete saws, masonry saws, core drills, diamond core bits and cost cutting diamond and abrasive blades.

Clipper can help you by building the expert knowledge of the world's largest manufacturer of abrasives into every product they offer.

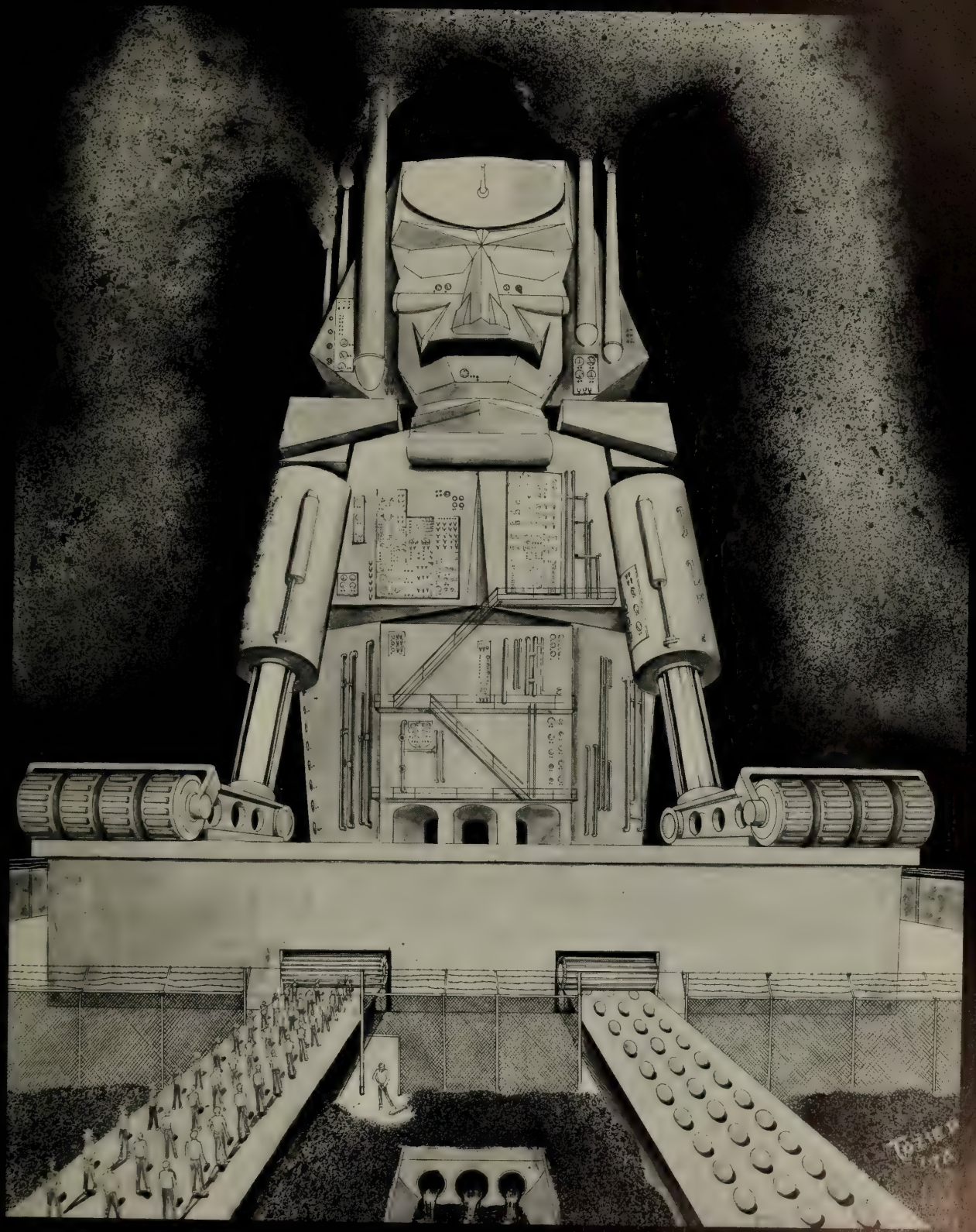
This year, go with the Pros...

Your Clipper Dealer and

clipper
NORTON

August 1974

WPI journal



Energy: where's it going to come from?

WPI journal

Vol. 78, No. 1 August 1974

3 **On the hill**

4 **Feedback**

7 SPECIAL SECTION: **Where's it going to come from?** *Energy sources and resources*

9 **"Don't sleep with two women in your bed"** *... perspectives on energy production*
A four-point program for energy development proposed by Dr. Edward Teller, sometimes known as the "father of the hydrogen bomb."

15 **Let the sun shine in**
The real possibilities for the use of solar energy now, as told by Dr. Peter Glaser

20 **Commencement and reunion**

27 **Your class and others**

38 **Completed careers**

The cover: a pen drawing by Steve Tozier, '74, done as a final project for a course on the philosophy of environmental controls.

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, *chairman;* Donald F. Berth, '56; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography: Typesetting Service, Providence, Rhode Island

Printing: Davis Press, Worcester, Massachusetts

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright© 1974 by Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster:* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI Alumni Association

President: W. J. Bank, '46

Vice President: F. S. Harvey, '37; W. A. Julian, '49

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr. '44

Executive Committee Members-at-large: B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55; L. Polizzotto, '70

Fund Board: W. J. Charow, '49, *chairman;* L. H. White, '41; G. A. Anderson, '51; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

13 seniors confront the administration

A quiet revolution surfaced on campus this spring. A small group of students, all seniors and campus leaders discovered last winter that they *all* felt that students get the short end of the stick in dealing with the WPI administration.

"We decided that we would have to take the initiative to improve the situation," says Len Brzozowski, leader of the group. "In a rapid four-year stay at WPI, a student doesn't even begin to become aware of many of the realities of our campus until senior year. By that time, either it's too late to try to initiate change or the graduating class is too wound up in job-hunting to care. The *'Well, it's not our problem anymore'* syndrome is the rule rather than the exception. We were determined not to let this happen to us."

So Len and John Young, Lee Turner, and Garry Balboni started talking with other students to determine a viable course of action. Len freely admits, "some of our early thoughts were based in anger and disgust and would have served no one." Peter Thacher provided a moderating influence on the group, which responded to his concern for not making false accusations, not being spiteful and contemptuous. The group's concerns ranged from the cost of food on campus to the lack of communication among the WPI community.

By the beginning of April, the group had decided to proceed with factual exposes of some of the practices they felt were unfair, to meet with the President's Committee, to publish a series of detailed articles and reports in the campus newspaper, and finally to meet with individual members of the administration about specific problems.

The group had been operating quietly, and the first public indication of their existence came on Tuesday, April 30, when the entire front page of the *WPI Newspeak* was devoted to an open letter from the group, by then numbering thirteen. The group identified themselves as those "responsible for the big social weekends, the Class of '74 kickoffs, for the operation of many clubs, the student government, campus hearing board, the IFC, and several other bodies. We are . . . just beginning to grasp the nature of this institution, its business functions, its power structure, its services, and the sources of support for our endeavors as well as the sources of bureaucratic doubletalk and noncooperation which only serve to make our efforts more difficult."

The letter went on to discuss specific, representative gripes and problems. There was the $192.75 charge by Buildings and Grounds for the use of Alden Memorial Auditorium one evening, which by the student's reckoning was $125 too much. There were complaints about the food service on campus, charging that one could eat better for less at certain local restaurants which operated at a profit. There was the lack of communication, and where are faculty and students supposed to meet out of class? The only apparent answer, the Pub, was described by the thirteen as "suffering from the same cancer that infects the snack bar." In the same vein, groups of students had attempted, during the year, to invite faculty members to lunch and dine with them on occasion. The campus food service was asked to contribute the faculty member's meals ($2—vs. the $1.50 charged in the faculty dining room for allegedly better food), but they refused. Dean Grogan solved that problem by dipping into one of his own budgets.

The long list of complaints, small and large, added up to a serious problem. But it was a problem that they wanted to solve, not ignore.

"In our opinion, the students on WPI's campus are effectively nothing more than second class citizens. This is in spite of efforts on the part of some Boynton administrators and because of some other Boynton Hall inhabitants . . . The 'Tute' has been quite good to us though, and for that we are thankful, but we cannot accept the way the college is and some of the ways it is being run. There are so many crying needs, yet so much blatant waste and bureaucracy. We believe that WPI is one of the few engineering schools in the world that is really trying to be innovative and we feel that its objectives are both vital and noble. Yet we are cursed with less-than-innovative administrators, back-stabbing politics, kingdom-building, and cases of people working against each other. This institution's growing pains are intense right now, and we are not at all sure that even our lofty goals and high philosophies will get us through. Brown University, which possessed an innovative program similar to ours, just this year threw in the towel and retreated to a more conservative and rigid program. We want very much to insure that WPI will not suffer a similar fate."

The letter recommended action that would be felt: *we have decided that we simply cannot justify in our minds making any contributions to the general WPI Alumni Fund when we graduate this June second. Instead we shall submit only restricted contributions . . . This is one of the surest ways to help formulate school policy even as an alumnus. We have just not seen it demonstrated that those who administer the school policies have a good perception of how best to use those funds in a*

manner which meets the need of the student body . . . We feel it's about time that someone indicated the urgency of the situation . . . We also wish it to be known that we stand ready now, in four weeks, or in ten years, to help WPI in any way that we can to effect whatever changes are ever necessary to make this a better college for its students."

Not heralded in that first *Newspeak* letter, but voiced to the President's Committee and later published, was a complaint about the content of the *WPI Journal* (reprinted below in Feedback).

The thirteen seniors, (including, besides those already mentioned, Bill Delphos, Ted Ledden, Mike Boyden, Tom Burns, Dave Demers, Jim Rubino, Dean Stratouley, and Dave Lapre) were cordially received by the President's Committee, which included President Hazzard, Vice President and Dean of Faculty Ray Bolz, Vice President for Business Affairs David Lloyd, Vice President for University Relations Thomas Denney, Dean of Student Affairs Donald Reutlinger, and Director of Physical Planning and Plant Services Gardner Pierce; Steve Hebert, secretary-treasurer of the Alumni Association, was also at the meeting.

The students presented their case and encountered, in Brzozowski's words, "a responsiveness which I have not seen in some time. Each administrator seemed concerned about the problems we brought to his attention." Vice president Denney was impressed with the concern the students showed for WPI and the entire campus community, and with how well they had done their homework. "These students have done a real service to WPI. They have brought out some problem areas which we had relegated to the back burner, so to speak, and given us what is perhaps a more realistic perspective on campus life from the students' point of view. Most of their suggestions and proposals were constructive and really helpful, and I hope we in the President's Committee can maintain a continuing dialogue with them. Their input is important and valuable, and it is too easy for us not to give proper weight to students' views when we are too well insulated from them."

In the weeks that followed this meeting, the student members held talks with individual administration people about the specific problems. Agreements were worked out regarding hall rental charges and the campus Pub, which has been speeded up with the help of some money released ahead of schedule by WPI, a restricted gift from the Class of '74, and the offer of students to help with the work.

The juniors and sophomores who were recruited by the original thirteen plan to continue their efforts in representing the student viewpoint to the administration. They will meet periodically with the President's Committee so that their ideas and view will be accurately presented to those charged with making policy.

The thirteen seniors are now thirteen alumni, and their part in the situation has changed, their leadership roles passed on to the Class of '75. About the experience, Len Brzozowski feels pleased. "I think we accomplished about everything we could realistically have expected to this year. But I sometimes wonder if our concerns about communications and a student-centered campus were really understood. I hope so."

The greening of the campus — but where are you going to park?

With the (so far temporary) closing of the West Street and the virtually complete elimination of vehicle access to the East Campus from Salisbury to Boynton, there has been a real change in attitude among the WPI staff. Most people's reaction is resentment and/or disapproval. Before, a campus visitor was reported to have said that the college staff could park closer to their offices than he could to his house. That's all changed, with some 45 fewer parking spaces available, but the real crunch is yet to come; right now it's only inconvenient. Come September and the return of the students, things are going to get crowded and the campus police are likely to have a field day ticketing parking offenders. Come December and the return of ice and snow, the climb up Boynton Hill from the lower reaches of the Gordon Library parking lot may become a real adventure.

It used to be that you could hardly see what certain buildings really looked like, because they appeared built on a foundation of automobiles. Now everything is bare; being summer, of course, there isn't much pedestrian traffic to make the place looked lived in. The roadway in front of Boynton Hall was sawn in half lengthwise, and the outer half of the paving removed and grassed over. The ex-parking area along Washburn facing Salisbury has been similary depaved.

If you come to campus now, there are precisely four places you can enter (vs. the previous nine), and in no case can you get very far. Visitor parking is still on the West Campus, but there is only one entrance (off Institute Road between Daniels and Riley) and one exit (alongside Morgan). No traffic is permitted on the circle betwen Alden and Higgins, the one with the flagpole and the beech tree in the middle. There is also an entrance off West Street (which ends at that point) to the small parking lot behind Goddard.

On the East Campus, you can enter off West Street between Atwater Kent and Salisbury. That deadends in another small parking lot. The last place left is the Gordon Library parking lot, entrance off Boynton Street as before. This lot has been extended to the south, where it joins the road coming down the hill. No traffic is allowed on the upper hill road.

Fraternity life supported

In response to your recent issue devoted to WPI fraternities, I would like to point out that *fraternity* means *brotherhood;* and that fact is no less significant by virtue of its being so obvious. Brotherhood presupposes a

commitment to subvert individual interests in pursuit of mutual benefits. This sort of spirit seems to be lacking at WPI.

The old-style curriculum was highly standardized and regimented. There was little flexibility or opportunity for individual expression. The Plan is radically different in that it has few requirements, is almost completely flexible, and allows each individual to march to the beat of his own personal drummer. I submit that such a fundamental change in educational philosophy coincided with a fundamental change in student attitude.

Evidently, today's student is more self-contained and less of a "joiner." He seems to shy away from organizations and institutions as a threat to his individuality. Witness the coincident decline of such campus activities as student government, the campus newspaper, etc., with that of fraternities. Such an overemphasis on individuality is anathema to school spirit, fraternity spirit, "social responsibility," and to the concept of the "humane technologist." Indeed, such an attitude breeds paranoia, elitism, and a lack of the "common touch."

Fraternity life, while not for everyone, is completely consistent with the educational goals of the WPI Plan. Fraternities are not anti-intellectual; rather they are non-intellectual in nature. Fraternity living serves to develop interpersonal rather than academic skills. It complements regular studies much as does project work.

Fraternities are not anti-school-spirit. Historically, they have provided the bulk of class officers, intermural athletes, and heads of professional and honorary societies and other campus organizations.

Nor do fraternities foster immaturity or "locker-room mentality." Immature or destructive behavior is usually more prevalent in the dorms. In fact, fraternity living promotes responsibility and maturity due to the cooperative nature of the experience.

More importantly, fraternities provide a "supportive group atmosphere" which tends to stabilize otherwise turbulent student life. The institutional nature of the fraternity helps maintain a dynamic equilibrium which allows for growth and change while serving as a frame of reference. Fraternity living doesn't foster parochialism or shorten horizons. It serves as a foundation, not an anchor. It's something to build on.

Jack Zorabedian, '72
Saratoga Springs, N.Y.

The Current *WPI Journal*

An area deserving greater effort is the *WPI Journal*. Upon receiving the *Journal*, tha alumnus seeks information concerning his Alma Mater and the fellow students he knew so well during his years here. The parents of the students look for information about the school's academic and physical growth which distinguishes WPI from many other colleges, or for information on their sons' or daughters' friends. In the current [February 1974] issue of the *WPI Journal*, the alumnus and the parent find a small amount of the information they seek and discover a large amount of completely unwarranted and ludicrous pictures of ice, a technical report on the engineering of snow skis, and a small amount of alumni news.

Photographs of ice on the WPI campus are pleasant and should be displayed in a photography show or hung on many of the campus's blank walls, but these photographs should not be the main portion of the *WPI Journal*. One or two pictures of WPI in winter would be appropriate, but so many photographs with so little news on WPI or the alumni tend to lead the reader into believing WPI and its alumni are inactive and that the only means of filling up the publication is pictures.

The technical report on the design of snow skis by Brian Kashiwa '73 in his article, "Skis: They Aren't Barrel Staves Anymore," is another example of the *WPI Journal's* failings. The alumni and parents are interested in what recent graduates are doing, but such a lengthy report is unnecessary and certainly not the correct material for a feature article. The feature article ought to contain information concerning the greening of the campus, alternative plans for WPI's educational or physical growth, the new projects being worked on, this year's excellent job market for engineers, how well the Plan and the exchange programs with colleges overseas are working, the continuing problems and advantages of the Consortium, the exchange of teachers within the Consortium, or any of the many endless topics which show WPI is alive and striving to become a better, more exciting site for learning.

Finally in an area of great concern to both the alumni and the parents of students, the news of the alumni, the *WPI Journal* is far too concise and terse. Rarely was more than five lines of a narrow, printed column devoted to only one alumnus. The *WPI Journal* needn't be so brief, and it really ought to elaborate on the alumnus's news. The magazine should state not only the alumnus's new job promotions, new children, and marriages, but it should also include the alumnus's new address, interests, extra curricular activities, recent trips, or any other peculiarity which would be of interest to his classmates.

If the current issue of the *WPI Journal* is a fair representation of the staff's goals, then these goals must be changed. The *WPI Journal* must be changed into a source of information concerning WPI and its alumni; it should not remain a picture book with a technical report as a feature article. Many other schools and colleges produce viable alumni publications. Why can't WPI? According to the magazine's poll, the *WPI Journal* (not the WPI newsletter) is the "best single source of information about WPI" to 77 percent of its receivers. If this publication is a main source of information on WPI, then the *WPI Journal* has a serious responsibility to its recipients and ought to report the changing educational and recreational life of the students and the alumni. WPI is not dormant and neither are the alumni; however, the last issue of the *WPI Journal* is.

The Committee of
Concerned Seniors
WPI

energy

SPECIAL SECTION:

Where's it going to come from?

Energy Sources and Resources

ENERGY IS ABOUT as overworked as any word can be these days. Perhaps only Watergate is heard more. First there was the gasoline shortage predicted for last summer, which mostly never materialized. Then came war in the Middle East, the Arab oil embargo, and *Lo and Behold!* we had the "energy crisis" on our hands, and we all spent last winter hunting for open service stations or waiting in line at the pumps. But Secretary Kissinger worked things out in the Middle East, the gas stations stopped keeping banker's hours, and the federal government told us energy was now only a "problem." Of course energy, in whatever form we got it, suddenly cost a heck of a lot more.

But it's more than a consumer problem. As engineers and scientists and businessmen, as inventors and mechanics, as people living in an age whose very fabric has been shaped by technology and the Industrial Revolution, as people whose lifework is inextricably tied to technology — energy is particularly important to us. Indeed, we can define technology in its broadest sense as the ability to produce and use energy — to extract the most energy from available resources, to use that energy most efficiently to meet our needs and wants.

So WPI, which is committed to a technological society, has a special concern with energy. More than a year ago, before the effects of limited energy resources were apparent to many, the mechanical engineering department at WPI began assembling a year-long colloquium with noted speakers discussing various aspects of energy production and utilization. Professor John Mayer, whose interests encompass both antipollution automobiles and nuclear reactors, put together a series of nine lectures which, in their entirety, constitute a remarkable statement on the energy situation.

With this issue of the Journal, we are publishing two articles derived from that ME colloquium, both dealing primarily with non-nuclear energy resources. In the next issue, we plan to present a further series of articles dealing with the problems and promise of nuclear energy.

"Don't sleep with two women in your bed"

Perspectives on Energy Production

By Dr. Edward Teller

Dr. Edward Teller was born in Budapest in 1908. He received his doctorate from the University of Leipzig in 1930, then taught at Göttingen, Copenhagen, and London before coming to the U.S. and George Washington University in 1935. He was a theoretical nuclear physicist until 1939, when the discovery of controlled fission and the menace of Nazi Germany and imperial Japan drew him into work on atomic explosives. His wartime assignments took him to Columbia and then the University of Chicago. After World War II, he continued work on atomic weapons, believing their development necessary for world peace. This work has given him the sobriquet of "father of the hydrogen bomb." Dr. Teller is currently University Professor of Physics at the University of California and associate director for physics at the Lawrence Livermore Laboratory, the nation's second weapons laboratory, which he helped establish.

I DON'T THINK it is right to speak of an energy crisis, and certainly not in the past tense. If there was an energy crisis, the real difficulties are yet to come. Oil has become the prime source of energy throughout the world, partly because it is easily transported, partly because at least for the time being it is accessible (or was so until recently), and partly because our instruments to use energy have been adapted to oil so therefore we have a tremendous capital investment in oil.

To appreciate what has happened and what is likely to happen, I would like to mention to you one of my great accomplishments. I have invented a new unit. I don't like to talk about billions of barrels — it's a little hard to imagine them — instead I talk about A units. An A unit is the amount of oil reserves that the Arabs have. Now, the known reserves of the rest of the world are one-half of an A unit, and what is really accessible in additional oil is unknown. It is clear that, within a year, the price of oil has risen by a factor of four. That has caused some slight disturbances in the United States. The effect in Europe and in Japan is much more serious. The consequences in developing countries like India may be tragic because their new crops, which yield more per acre and which they need for survival, will not grow without nitrogen-based fertilizer. And in order to produce these fertilizers, one needs gas or oil, which the Indians could afford before the recent price rise; whether they still can afford them is more questionable. The starvation of millions of people is certainly a horrible effect, compared to which anything we have gone through becomes insignificant.

So here we have an energy problem which is made more difficult because, with the world-wide growth of energy demand — and most of this growth is not in the United States — the shortage is apt to become more severe. Now, the solution to this problem, in my opinion, is in one field and essentially only in one field — technology. Technology can solve the energy shortage, and furthermore can solve it without deterioration of the environment. The question is only, How? The possibilities are many, and the practical possibilities are more than I can mention here in a way that will make sense. Whatever I omit, I omit because I believe that these are not practical solutions.

Oil and Gas

I propose that there are essentially four ways in which the energy shortage can be alleviated and, in the long run, remedied. The first of these is to look for more oil and more gas. Today we have 1½ A units. Perhaps the total accessible oil in the world is not more than another 1½ A units, altogether 3; perhaps it's lots more.

Let me mention an exciting possibility. The continental shelf is an extension of the continent under the ocean, a shallow part down to a depth of roughly 800 feet, which was laid bare in the ice ages. Oil has been produced by decaying living things where the decay occurred under conditions practically excluding oxygen. People have been looking at the continent and the shelf as the main regions where these decaying living products have been deposited over many millions of years. At the limit of the continental shelf there comes the continental slope, a very steep section which goes down to a depth of a few thousand feet. And beyond that comes the continental rise. (I don't know why they call it rise when it goes downward; but if you look at it from the point of view of the abyss, the deepest part of the ocean, then it is indeed a rise.) It is believed that this rise was formed by loose material from the continental shelf being shaken down. It has been found that on the continental rise there are great masses of sedimentary deposits, and in these deposits, you find the kind of trap in which oil accumulates, like soil domes. And drilling near such soil domes, oil has actually been found in the Gulf of Mexico at a depth of many thousand feet. There are those who believe that more oil is on the continental rise. There may be 10 A units there. If so, it will be quite a technical problem to produce that oil cheaply. It will have to be done with the help of apparatus which works by remote control and under very high pressure.

In all the oil fields where the oil has been pumped out, the "dry" wells still have two-thirds of their original hydrocarbon.

There is another question, a very important one: What about the American continental shelf? Along the eastern seaboard, in the wide expanses of the continental shelf which essentially belong to Florida, there is no drilling on both sides of Florida. Drilling has been essentially forbidden for fear of oil spills. These oil spills are exceedingly unlikely. The oil spill in Santa Barbara never should have occurred. One of the simple rules, to have a casing going all the way down, was violated. There is also a rule which says that an oil company that wants to drill, in whichever region, has to make a deposit of $32 million which the company forfeits to that region if there is a spill. But on top of that, the permission is simply not given. Now having said that, I would like to ask you to guess how much money we spend, in the whole of the United States per year, for the purpose of cleaning up an oil spill if it occurs. The figure is $2 million. It is incredible. It might be justified to spend so little if there would be no hope of success, but there is. One can corral these spills. One can sop up the oil. The best way may well be to drop bacterial cultures, bacteria which have the peculiar habit of living only on oil—funny taste. However, these poor oil-eating bacteria starve and die off, and if there is an oil spill, there are no bacteria to eat it. It takes a year until they multiply back and then, in the end, Santa Barbara is clean again. We could have these bacterial cultures ready to go if there is an oil spill. And there is hope of cleaning up the oil spills promptly. Here is a little piece of technology which should be pursued and isn't.

There's still another way of getting oil. In all the oil fields under our feet in the United States where the oil has been pumped out, the "dry" wells still have at their bottoms two-thirds of the original hydrocarbon. There are various reasons why one cannot get at that. The most common is that what remains is too viscous. One of the possible remedies is called fire drive. You pump air down one oil well, light a fire and try to pump out of a neighboring well. The fire will heat the neighboring oil and decrease its viscosity. Furthermore, as the oil burns it makes carbon dioxide, which is sucked ahead of the flames and dissolves in the oil. And oil in which carbon dioxide is dissolved has a lower viscosity still. One probably could get a second third of the oil reserve this way. Good work by the oil companies is proceeding, but this sort of thing should be encouraged.

Wherever one finds oil, one usually finds gas. We need more gas: we seem to be running out of it and, unlike oil, gas is not easily transportable. To liquify it and transport it is very expensive, about $1 per thousand cubic feet of high BTU oil, where the regulated price today is approximately 27¢. We could produce more gas from tight formations, formations with small pore sizes which have to be shattered by hydraulic fracturing, by high explosives, or by nuclear explosives. All three methods have to be tried. Research of this kind is apt to pay off more than 100 to 1 if it is successful. I believe all three, but in fact only one will be successful, and one does not know which approach will be successful, because whichever of the three is cheapest will get rid of the other two. But nobody can predict which will be the cheapest, which will be the most adaptable. What has to be done is to proceed on all these fronts because here is the possibility of much more oil, much more gas . . . though not enough. So this is the first step. It could come at the earliest time. It could suffice for a few years, but where do we go next?

Other fossil fuels

So the second point in the program which I am recommending is to utilize other fossil fuels. These can be used in a variety of ways. I want to zero in on the method which I believe is the cheapest and best, the *in situ* utilization of these resources where we convert the fossil fuel into something that's usable right where the fossil fuel sits.

In the case of coal, this has been tried, it hasn't worked, and we know why it hasn't worked. You pump in air or oxygen in one well that you have sunk into a coal field and you try to draw out gas out of a neighboring well, having added water and using the old city gas process according to which coal and high pressure steam will give hydrogen and methane and carbon monoxide. Now let me discuss how it works if it works well . . . and it usually doesn't. You sink a

well to a shallow coal vein only a few feet thick and you pump in oxygen if you want high quality gas, or air if low quality is sufficient. (It's just as good as the high quality gas, but the nitrogen remains in it and dilutes it, and then it becomes too expensive to pump around in pipe lines. You have to use it on location.) Now you try to pump out here from another well. What happens first of all is that the whole thing is shallow, so you can't put in high pressure steam. Otherwise it blows up. Second, if the burning begins, it proceeds in a funny profile. It burns out here and there but then the gases rise and only the top of the field burns. And even that doesn't burn completely, because the combustion goes around the regions which are less permeable. You will find fingers which extend from one well to the other, and the process is uneconomical.

What should be done, what my colleagues in Livermore are trying, is to go to Montana or Wyoming where there are deep coal layers which are 50 or 100 or 200 feet thick, and which are not mined because they are too deep. Now we start by planting high explosives, one ton of them. An explosion of this kind at a depth of 500 feet or more will just tickle your soles if you stand right on top of it, so there is no trouble about it. With these explosions, as we found out from nuclear explosions in Nevada, we can reduce coal to rubble with caves in between. Now we pump down again, let us say, oxygen and try to saturate the top with oxygen and light it. We light it throughout the whole surface of many, many acres so that the top is burning. The flame will not spread farther down until the top has been consumed. This way gravitation works for us and we can burn essentially all of the coal; furthermore, we now have a head of 500 feet of water, which gives enough pressure to operate where the chemical reaction will best proceed.

Maybe this process won't work, but it should be tried. We had the hardest time trying to sell it, and we now have $3.6 million to try it next year, enough to try it in one location. It should be tried simultaneously in a dozen locations of different properties. We believe we can make gas this way, not for the regulated 27¢ but for 50¢. This is cheaper than

You can easily get confused about oil shale, because it is not shale and it contains no oil.

bringing in the gas from abroad. This is cheaper than digging up the coal from below. This does not have environmental disadvantages. It does not endanger the miners and it essentially does not hurt the environment. There might be, if we succeed, some subsidance, but we are not going to destroy the vegetation on the surface. What's most important, we are not going to import the one ingredient that really disturbs the environment — man. If we wanted to mine the coal and then convert it in man-made steel vessels, we would need plenty of water, and in addition to the 300,000 souls already living there, a million more would have to go into Wyoming; strangely enough, the people in Wyoming don't look forward to such ample company.

There is a similar situation with respect to oil shale. (You can easily get confused about oil shale because it is a material which is not shale and it does not contain any oil.) Instead of shale it is essentially a calcium carbonate — limestone. And it has hydrocarbons which are not oil but which will become something like oil when you heat them to several hundred degrees. You do the same thing as I described to you in the *in situ* production of gas from coal. It is beautiful. First of all, you don't want to pump in oxygen, you pump in air — because what you are going after is not gas but oil, and air will not mix with oil. Second, you omit the water. You don't need the water. You dry it up. Thirdly, oil shale deposits come in phenomenally thick layers. There is a region in the northwest corner of Colorado, quite desolate, where you find these oil shale deposits in a thickness of 2,000 feet. The deposit in that one place alone amounts to four A units. Now in this case if you want to do it cheaply you should make a nuclear explosion below the oil shale layer. In the case of coal I did not propose it because the layer was too thin. Such a nuclear explosion 2,500 feet below the surface will make a cavity 200 feet across, relatively small, filled with rock vapor and carbon dioxide liberated from limestone. Then, as the vapor cools the roof collapses (we have seen it many times at our test site in Nevada) and this continuing collapse extends upward maybe 800 or 1,000 feet. Now you have rubble there forming a natural rubble chimney, a natural retort in which the process can be executed. We estimate that we could make oil for approximately $3 a barrel by this method in ample amounts. We haven't been allowed to try it, not even once. Environmentalists should like it because it gives minimal environmental disturbance. They are opposed to it, perhaps because they think of a nuclear explosion as a nuclear explosion and, of necessity, evil. So this is the second possibility, the *in situ* production of gas and oil in a vault. We could have plenty and both could be produced relatively cheaply. $3 per barrel and 50¢ per thousand standard cubic feet are costs which are pretty close together in dollars per calorie.

Nuclear Reactors

Now, a third approach is electricity produced with the help of nuclear reactors. Some people raise the false objection that we are going to run out of nuclear fuel and therefore we need something very difficult and very new — the fast breeder. I used to think this was a really important project... but we've been trying to get it going for 29 years and it hasn't worked yet. I think there's a lesson there.

About thermal pollution we have an expert, and the expert sits in the right place. She is Dixie Lee Ray, head of the Atomic Energy Commission, and she happens to be a limnologist, a person who studies the fish and the spinach to be found in lakes. Her remark on thermal pollution is that the fish are much more adaptable than most people think and she wishes the environmentalists would be as adaptable as the fish.

Now we must deal with the radioactive hazard in normal reactor operation. One of my colleagues at Livermore, Dr. Tamplin, went to a hearing for the Dresden III reactor in Illinois, and protested. An AEC employee asked him, "Dr. Tamplin, from which do you think you would get more radiation — from leaning up against this reactor for a full year or from your habit of sleeping with your wife each night?" Well, Dr. Tamplin was a little confused. So the AEC guy explained, "I don't want to imply that your wife is particularly dangerous, but she, as all of us, has some potassium in her blood and some of the potassium is radioactive and of course you get more radiation when you are next to her than from your own potassium. So for the sake of comparison, the reactor or your wife?" Dr. Tamplin still didn't know. So the AEC man went home and wrote a report, which fortunately he did not classify (I got a copy of it). He describes all this and then he says, "I made the calculation and I found that one gets a little more radiation from Dresden III, and therefore I will not recommend to the AEC that each married couple should purchase twin beds. However, from the point of view of the radiation hazard, I warn against the practice of sleeping each night with two girls. Then you get more than from Dresden III." So he has neatly bracketed the danger from Dresden III. I think I have answered the normal radiation danger from reactors on the level which this worry deserves.

Therefore I will not recommend to the AEC that each married couple should purchase twin beds. However I warn against sleeping each night with two girls. Then you get more radiation than from Dresden III.

The rare accident that may liberate most of the radiation of a reactor is a much more serious affair. It could kill thousands of people. It could shorten the lives of many more thousands; but, what is worse, with the present radiation hysteria literally millions of people would imagine they were dying. This is something that never must happen. So one has to prevent these accidents, even though reactors can behave in all kinds of surprising ways. I have been chairman of the world's first reactor safeguard committee. I want to quote to you one of the favorite definitions of a great physicist, Neils Bohr, his definition of an expert. An expert is a man who through his own painful experience has found out all the mistakes one can commit in a very narrow field. And I claim that, in reactor accidents, no experts exist because we haven't yet found out all the mistakes that one might commit. We have been very careful and not a single major accident has occurred so far. But we must be even more careful.

I want to make one suggestion which I think is reasonable. Let's build reactors by first digging a pit in dry soil, putting the reactor at the bottom of it and then filling up the pit with appropriate kinds of earth — dense but not rock, so that it won't split, and 200 feet between the top of the reactor and the surface will be enough to guarantee, from all our experience with hundreds of nuclear explosions, that even if the reactor destroys itself and causes damage of $500 million, not a single person will be hurt. If we have the reactor underground, we need pipes going down and that's a little dangerous. Pipes to carry cooling water, to bring up the steam. The turbines can be on the surface or just under grade. They need lots of cooling water, the reactor does not. You need an access shaft. All these have to be closed up if there's real trouble but you have 200 feet or more in which to make the closure. And the greater the distance, the greater the certainty that you can close safely. I think this is worth considering.

Some of my friends have estimated that this will cost more than present reactor construction. Others say it will cost 50 percent more. And my answer to that is *so what*, because today, having to go back to square one in discussing any reactor wastes years. To make a new reactor today takes ten years. We could easily and safely build them in four years if we only could convince people that they are really safe. Putting them underground will make them much safer and the difference between four and ten years, in the present money market, corresponds to practically doubling the price of the reactor.

I'm not sure that putting reactors underground is the best answer. It is a possible answer, and the scandal is that no really decent engineering study has been made yet. Nuclear reactors are competitive today. They could be available the world over and not only in countries which are rich in oil or gas or coal or oil shale or tar sand. They could be used everywhere and should be. And furthermore there is no danger that we'll run out of fuel. Uranium, particularly poor grade uranium which we can afford, is abundant. We know in present reactors how to use an auxiliary fuel, thorium, and one could run present reactors as they are or with slight modifications, in such a way that four units of thorium are used for every unit of uranium. And thorium is and will remain dirt cheap. And as time goes by, gradual improvements will mean that you need less and less uranium and can use more and more thorium. So here

is an important solution. Today 35 percent of our energy goes into producing electricity. In the nuclear form it is cheap and clean and we can make it safe. And I hope that by the turn of the century 50 percent of our energy will come from reactors. This may mean a thousand reactors for the United States, which may mean an investment of $500 to $700 million. We can afford it. In fact, other energy sources are much more expensive.

Don't waste it!

The last point of technological achievement is simply to cut down on the wasteful use of energy. Of course that can be done by setting the thermostat at an appropriate level or generally being a little more spartan. And I'm not arguing against such principles. But the real point is that an incredible amount can be saved just by putting in more insulation.

Now I would like to give you two examples on how to save energy. One, of course is the automobile. I have saved all my criticism for Detroit, because if someone deserves it, it is Detroit. I am sure that except for the mental inertia in Detroit we could have a fifty mile per gallon car in perhaps as short a time as three years. It would be a smaller car, between 2,000 and 2,500 pounds. It should be a hybrid, having a gasoline engine coupled with batteries, maybe simply lead-acid batteries, maybe something better. The latter will

The way we make steam today is to boil water — and that's wrong.

be too heavy if you want to run on batteries alone but I want to run on batteries only for short trips, twenty miles or less. Then you can plug in your car and use the more efficient electricity. But even without that you can get fifty miles per gallon if you take the best gasoline engine, use it at its optimal speed and at no other speed, and use the batteries partly for the energy surges that you need and partly as a reservoir into which to put back energy when otherwise you would have applied your brakes. You don't throw away the energy when you brake your car; you charge up your battery. With a smaller car and better energy economy, you could have cars that will cost more but which will save energy and in a couple of years at the high gasoline prices which are and may be coming, you will have the capital investment paid back. We are not going to get something for nothing.

Except for the mental inertia in Detroit, we could have a fifty mile per gallon car in perhaps three years.

The other application I would like to tell you about also requires some investment and this is simply the use of processed steam, which is one of the biggest energy users in the United States, well above 10 percent of all our energy use. Now let me tell you how I would do it. The way we make steam today is to boil water — and that's wrong. At least we shouldn't boil it at the boiling point. And we certainly shouldn't use a real hot flame to boil it, because that's high grade energy, and it's not right to throw away these high temperatures and the entropy that this implies for such a relatively minor purpose as boiling water. One way to do it is to use solar heat, solar energy. I do not believe in the use of solar energy in producing electricity, but I know that if you are satisfied with water of 50 or 60° C, that you can get that by using black surfaces and flowing water over them in appropriate ways and covering it up with some cheap and transparent covering using the greenhouse effect —radiation in but not out. I suggest that you boil water at 50 or 60° C, which you can do by creating a modest vacuum. The vacuum is not thin enough to require very big turbines or very much machinery, but some is required. You are using cheap and easily replenished solar energy or other low grade energy. Then, you use work derived from electricity to compress this cool steam into denser hot steam, but this costs only a little less than 10 percent of all the energy. Even today we can produce electricity with 40 percent efficiency, and with improved methods we could step it up to 60 percent.

Now these are the four legs on which I propose to build an energy program. More oil and gas, the *in situ* exploitation of other fossil fuels, nuclear reactors, and technological tricks to utilize energy in the best possible ways. There is no question in my mind that if we go after the main points, if we are not distracted by will-o'-the-wisps, and if we use the ample resources of the United States, we in this country can have plenty of energy. There is a broader problem — can there be enough energy for the world? I hope yes, but I have to acknowledge that this is a bigger problem about which I do not know enough.

Let the sun shine in

Solar Energy

by Dr. Peter E. Glaser

Dr. Peter Glaser is vice president and head of engineering sciences at Arthur D. Little Inc. He directs advanced engineering development projects on the use of solar energy, space and lunar science instrumentation, and technology assessment. Dr. Glaser is a graduate of Leeds College of Technology, England, and Charles University, Prague. He has advanced degrees from Columbia University. He is a past president of the Solar Energy Society and is editor-in-chief of the society's journal.

PEOPLE DON'T LAUGH at the sun these days. More people are interested in solar energy, and they're more attentive. For some reason they don't look on my colleagues and me as being wild-blue-yonder misguided people who obviously are working on something that may never come, or if it does come it will be at some future time and have a very small impact on the way we organize our lives. It is clear that solar energy today is a much more serious proposition. I would like to survey some of the possible applications of solar energy today and indicate where we can go from here, what some of the challenges are, and indicate also where some of the costs have to be in order for solar energy to take a place in the competitive scheme of our future energy supply.

The sun smiles on us today, so in a sense we are no longer dealing with a subject that is strange to the people in our government. For the first time, the United States is spending a significant amount for solar energy research and development. Over the next five years this may reach about $200 to $600 million, depending upon which of the various solar energy bills passes congress. That $200 million is the sum of money which Dr. Dixie Lee Ray has proposed as part of the President's $10 billion funding program for Project Independence; the $600 million is what several congressmen feel and what industry feels is a more realistic figure.

By the time we receive solar energy here on earth, it is about 1 kilowatt per square meter. As such it is highly diffused, and that's where some of the problems lie. Compared even to the flame at the end of a match, we have to be able to convert it, we have to be able to harness it, and we therefore have to be able to cover large areas in order to do this effectively. We have used solar energy in many ways without even thinking about it: for example, the drying of fertilizer in Chile, salt in Utah, fish on countless seacoasts, or today, in these energy-saving days, even our Monday morning wash. We've tried to use solar energy to help other people, particularly in developing countries, with the development of solar cookers. We've learned there are some problems in overcoming cultural resistance, because many of these peoples prefer to eat their main meal at night rather than at lunch time. We've also thought it would be nice to

develop these solar cookers for our more pleasurable moments, and indeed some of these devices are on the market today. Somehow they haven't quite caught on as popularly as the hula hoop did. We've also learned how to take the heat of the sun and use it to distill brackish or ocean water in a solar still to produce fresh water. On island communities this makes eminent economic sense, particularly if you use 10,000 gallons or less. And in the Greek islands and some of the Pacific islands, on the coast of Pakistan, and in Australia, these kinds of solar stills are in operation today.

The next step, rather than just vaporizing water, is to use the sun's heat to produce hot water. There are plastic hot water heaters developed by the Japanese which you can buy for $10, enabling us to provide hot water at a very low cost. Various large Japanese companies have produced millions of these hot water heaters and sold them all over the world. The Australians have added an electric heater so that you can still have hot water even when the clouds obscure the sun, and that's what it's all about. They're producing about 63,000 square feet of these hot water heaters a year now in Australia. They've equipped schools, hospitals, and other public buildings with it. The Grover Cleveland Junior High School in Boston was equipped just recently with similar hot water heaters, so we can learn from others. There are four schools in all which were equipped with these hot water heating solar collectors. What is significant about this is that from the time the National Science Foundation decided to do it to the time it was operational took exactly two months. That says something about the maturity of the technology and our capacity to produce about 25,000 square feet of solar collector area. With this we can also heat air and use the air for such prosaic purposes as the drying of wood, which of course conserves energy.

There is a house in Washington D.C. that cost $12 to heat with oil last year.

We used to do the same thing in this country; in Florida solar hot water heaters were very popular 40 years ago. Today of course they no longer are because natural gas came in and electricity was cheaper and it was just simpler not to bother with things on the roof of the building. I talked with an acquaintance who had one of these on his roof and he said, "Well, the price oil and gas are now, I wish I still had mine on the roof working." If you look at the amount of solar energy we have available to us in the United States, we are a fortunate country, because just about everywhere there is enough solar energy to take care of our heating and eventually our cooling needs. The principle involved is very straightforward. We put a so-called solar collector on the roof of the building and we pass a fluid through it, which may be air or water or a water-glycol mixture if we are in freezing climates. This heated fluid is then stored in a tank from which it may be withdrawn whenever we wish to heat the building. We use an auxiliary heat source, since it wouldn't make economic sense to rely completely on solar energy. The principle of solar collectors has been explored for many years, analyzed and is well known. Typically one or two glass panes are used to keep the convection and conduction losses to the outside to a minimum. A blackened surface is used to absorb the sun's rays; if this is insulated as an absorber plate, typically metal, we can obtain reasonably high temperatures, between 170-200°F. The fluid is then passed through passages in the absorber plate and this is the objective, to heat the house. M.I.T. built such a house in the 1950's; it operated very nicely and was then abandoned because a barrel of oil cost $1.75 and the solar house just didn't make any economic sense. There is a similar house in Washington, D.C., that last year cost about $12 to heat with oil. There's a house in Denver, Colorado, in which the owner has lived for 15 years and he hasn't had to maintain the solar collector on top of his roof. The design of solar houses is usually quite pleasing and certainly is effective.

We can go the next step, not only to heat but also to cool, because the heat can be used to actuate a refrigerator based on an absorption or a rankine cycle principle. You may recall there once were gas-operated refrigerators. So we have a system which provides heat in the winter and cooling in the summer with some auxiliary input from electricity, oil, or gas.

The next step is to provide not only heating and cooling but electricity, and we can place solar cells in a collector. A house has been built by the University of Delaware which also produces electricity while heating and cooling the house. We've just completed the design of a laboratory for the Desert Research Institute. This will primarily use solar energy for cooling, and it indicates that you can have a fairly large structure supplied with solar energy. It can be aesthetically pleasing and all of the various functions of a laboratory can be built into it. We've also completed a design for an office building for the Massachusetts Audubon Society in Lincoln, Massachusetts.

You might ask if all this makes economic sense. For those of you who wish to study the subject I urge you to obtain the NSF/NASA Solar Energy Report from the department of mechanical engineering at the University of Maryland. In 1972 this report indicated that solar heating was competitive with electrical heating in eight major cities of the United States. With the upward changes in the cost of gas and oil, of course, it may now be competitive in many other regions as well. Recognizing this potential, we at Arthur D. Little have started what we call our solar climate control project, whose objective is to look at the possibility of developing a new industry and to see whether we can indeed make technical sense out of this and what the marketing, economic, and business feasibilities are. We now have 80 sponsors of this

project, and this leads me to believe that we have an excellent opportunity to see in this country in perhaps three to five years at a cost which will be very attractive the kind of equipment that you may use in a residential setting or for public buildings. I might say that industry can make an offer which most people will find hard to refuse.

Another way we are using solar energy and expect to use more is to grow trees and algae and to use municipal wastes. We have a number of processes which allow us to turn organic materials into solid, liquid, or gaseous fuels. One ton of dry organic material produces about 100,000 cubic feet of methane and about two barrels of oil if you use a pyrolysis process. We can also use our municipal wastes, and pilot plants are going up in various cities so that we can recycle some of the products of photosynthesis.

The concentration of sunlight has for many years been of great interest and there are solar furnaces going back to 1612. In this country, a solar furnace was constructed at Natick and used by the U.S. Army to do high temperature research, to expose materials to temperatures of about 6,000° F. The French have built a solar furnace in a beautiful setting in the southern part of France. They have heliostats in front of the huge mirror which follow the sun during the day and direct the sun's rays toward the parabolic mirror where they can concentrate the sun's rays to reach 6,000°F and have an equivalent output of 1,000 kilowatts. This furnace, for example, can burn a two-foot diameter hole through half-inch thick steel plate in about 20 seconds, a really awesome demonstration of solar energy.

Of course we are very interested in the production of electricity from sunlight and we have a number of routes open to us —wind, ocean, thermal, burning the clean and renewable fuels such as I've mentioned, the concentration of sunlight, and the direct conversion of sunlight into electricity by the Photovoltaic process. Windmills are thousands of years old, and we are rediscovering that this is indeed a workable way of extracting power which can operate day and night. A windmill was constructed in the 1940's at Grandpa's Nob in Vermont near Rutland and it produced 1,125 kilowatts. It broke during an ice storm, teaching us that construction is really a major engineering problem. Today you can buy windmills of this size commercially, and there are thousands of them in use throughout this country and the world. Before the rural electrification administration came along in the 1930's, farms in the Midwest produced about 50,000 kilowatts with windmills of this type.

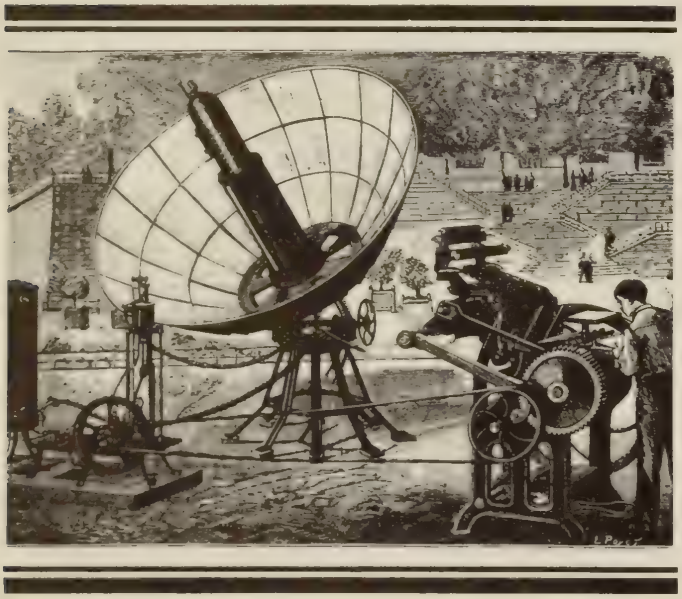
We can extract heat from the sun-warmed oceans. The process was first suggested in the 1890's and then worked upon by Claude in 1900. A plant was built on the coast of Cuba in 1926, another on the coast of Africa in 1956. What we do is scoop up the sun-warmed ocean waters, boil off a working fluid like ammonia or propane, and finally condense the fluid after it has passed through a turbine, with very cold water pumped from several thousand feet below the ocean surface. It can be done in principle. Again, there are engineering problems — how do you build very large heat exchangers which are efficient? The accent here must be on efficiency since the overall process is only about 5 percent efficient at the maximum. Practical efficiencies are about 1½ percent. The University of Massachusetts has designed a platform which might be anchored in the Gulf Stream to produce 400 megawatts of electrical power; it is possible to consider anchoring hundreds of these platforms in the Gulf Stream without unduly affecting the temperature of the current.

We can extract heat from sun-warmed oceans . . . we can consider anchoring hundreds of these platforms in the Gulf Stream without unduly affecting its temperature.

Direct production of power from sunlight has again been of interest for many, many years. In 1968 I received a Christmas card showing the central attraction of the Paris exposition of 1878, which was a solar powered steam engine driving a printing press on which was published a newspaper called the Sun. The idea was so worthy of imitation that a man built such a device in California in 1901 which produced 50 horsepower. An Egyptian application of this was designed by two British engineers, Schuman and Boyd, who produced 100 horsepower to pump Nile water for irrigation purposes. The Israelis produced a much smaller device which was competitive with the diesel engine and was exhibited at the 1961 United Nations Conference on New Sources of Energy in Rome. In this country this solar steam engine has been rediscovered, and a so-called solar farm was proposed by Professor Meinel about three years ago; it's remarkable how closely it parallels the work done in Egypt in 1913. Of course we've learned to place the tubes which are heated by focused sunlight in an evacuated enclosure, and to use selective radiation coatings which allow us to heat the material to several hundred degrees F.

The principle of a selective radiation coating deserves some explanation. If you just place a black surface in sunlight, in the visible part of the spectrum it will heat up and then in the infrared it will radiate, reaching a fairly high temperature. But the radiant heat loss is what we want to do away with, and therefore we use a coating that remains black in the visible and acts like a mirror in the infrared, and we can achieve much higher temperatures with this.

Pilot plants are now being discussed for this type of solar thermal energy conversion plant. The disadvantage of such a plant is that you have to have heat transfer loops and the larger the plant the larger the heat losses, so there's a practical limit on the size of power plant. One approach to obviate these heat losses is to reflect the sun rays onto a steam boiler with a series of mirrors, and the Russians did this about 15 years ago in a power plant which produced about 1,500 kilowatts.



I BELIEVE that really the future of solar energy conversion on a very large scale lies in the successful realization of a low-cost photovoltaic process. We know how to convert sunlight directly into electricity. This was done at Bell Labs in 1953 with a silicon solar cell. Silicon is the material we know most about. It's quite familiar in the semiconductor electronic industry, although there are some other materials which are quite interesting. The largest application of solar cells has been in Skylab, which produced 25 kilowatts. In spite of the various problems they had with deploying the solar cells, it was a very successful space mission and all the power that the astronauts used was obtained by direct conversion of sunlight into electricity. Now this tells us that today we can produce large arrays of these solar cells. But we don't have to go into space to use solar cells. We can use them on the ground for communication purposes; on the sea for flashing buoys, where during the sunny part of the day we charge up batteries and then during the rest of the day they provide the power to a flashing light or communication system, as on an unattended drilling platform. It is, of course, worth a lot of money if we don't have to go out to it every few months just to replace batteries. The Russians have done a lot of work in this field and they have produced solar cells which allow concentration of sunlight thereby reducing the area of solar cells required.

Today you can buy solar cells for these applications for about $20 a peak watt — that is, at the maximum sunshine available. Within two years this is expected to drop to $5 a watt, and within ten to fifteen years to about $1 a watt or less; there's a high likelihood that perhaps, as a market develops, that cost will reach 30 to 50 cents, or $500 a kilowatt. It's really primarily dependent on how large a market this is. A group of photovoltaic specialists got together a conference in Cherry Hill, New Jersey, last October and projected that for $250 million we could develop the process and do everything necessary to come up with this low cost. By the way, this cost of 30 cents is five times the cost of plate glass, the major difference being the energy input to the process. There are other materials, for example the cadmium sulfide thin film cells which can be mass produced again at low cost. The difference is that a silicon cell tends to be more efficient, about 15 percent; the cadmium sulfide thin film cell about 5 to 7 percent, so you have to cover a much larger area. Somewhere in the future is the possibility of developing organic semiconductors. At the moment these are still laboratory curiosities with very low efficiency, but we can imagine producing certain plastic materials with the semiconducting properties to convert sunlight into electricity, and this looks very interesting for the future. This then allows us to design larger areas, on rooftops or in the sunny part of the Southwest, where we can directly convert sunlight into electricity. Remember that if we have one square mile of these devices, even if they're just 10 percent efficient, we can generate 180,000 kilowatts while the sun shines. The challenge is "while the sun shines." It means that since it does not always shine, we have to have some form of energy storage on Earth, which may include batteries, pumping water to a higher placed reservoir, electrolysis of water to produce hydrogen.

I'm suggesting we use a fusion power plant which has been operating successfully for billions of years.

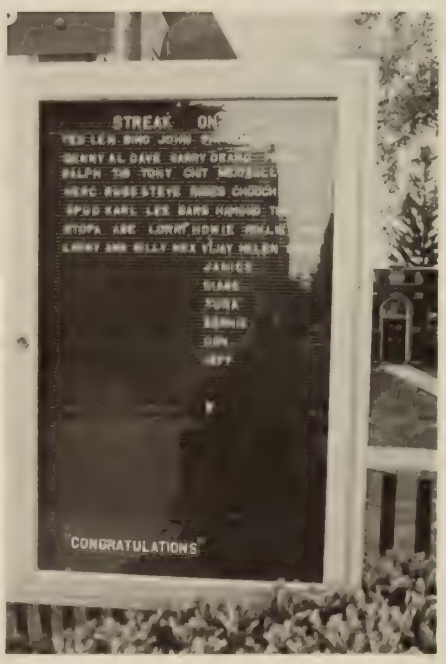
I suggested in 1968 that one way we can overcome this difficulty is to place a satellite in synchronous orbit around the earth where we have continuous sunlight available to us. The advantage then of doing that is that in this particular location we not only have no weather to contend with and no day and night, but also because we are in zero gravity we can use very flimsy structures greatly reducing the weight requirements and the amount of materials we use. We have studied the concept of a satellite solar power station, and it looks to us like this is not only technically feasible but it will be a very interesting and competitive way of producing power on a very large scale on Earth. The way this is done is to use solar cells and partial concentration of sunlight to reduce the area of solar cells. Then the electricity from the solar cells is fed to microwave generators which form part of a transmitting antenna, which allows us to direct a beam of microwaves back to earth where the microwaves can be converted directly into electricity. Today we can convert microwaves directly to DC with an 85 percent efficiency.

If we have one square mile of solar cells just 10 percent efficent, we can generate 180,000 kilowatts — while the sun shines.

There is no thermodynamic process based on the thermal cycle which can obtain this kind of efficiency on Earth. Furthermore, the power density in the microwave beam is so low that it does not constitute a hazard. We are able to devise a system for locking the microwave beam onto the receiving station so that it cannot move to any other place; even if somebody would try and do so, the beam would demodulate and the signal level then reaching the earth would be that of a TV signal. Since we have a lot of space available to us in synchronous orbit, we can talk about very large solar collector arrays to produce power on Earth which may range from 2,000 to 20,000 megawatts and do so in any desired location. You're no longer restricted to having a sun area, and you can imagine what this means to nations that don't have areas like Arizona within their boundaries. It may also be interesting to look at the cost, which today we project will be about twice the cost of nuclear power, based on the cost of all the equipment in space and on the ground as well as the space transportation system. And we find that all of the other methods which rely on nonrenewable fuel most likely will increase in cost as the fuels get scarce. Even nuclear power, which today is very important, though perhaps a temporary stopgap measure to meet our needs over the next thirty or so years, will eventually have to be costed at its true cost, including insurance as well as the disposal of radioactive waste material. We're quite confident that under the conditions we expect will prevail when this kind of device is ready twenty or so years from now, it will be very competitive with just about any other energy production method and thus this option for the longer term ahead would make us independent of any other energy source that we may need.

I believe that solar and fusion power, and in a sense both rely on the same physical process, can be the key to the long term energy independence that we all seek. The major difference is that I'm suggesting we use a fusion power plant which has been operating successfully for billions of years and which we know is really available to us and benign, since all life depends upon it.

Commencement and



THE RAIN GODS, which spent all spring trying to flood New England and maybe float it out to sea, apparently liked the idea of Commencement and Reunion this year, for both events, on separate weekends, were blessed with fine weather.

Commencement was its usual mixture of pageantry and pomp, relief that the four-year college trip was now officially over, and celebration of jobs and marriages and grad schools to come. Exactly 400 degrees were given out, including the single honorary doctor of engineering presented to former U.S. Attorney General Elliot Richardson.

In his commencement address, Richardson called for the decentralization of federal government power. "One of the byproducts of Watergate should be a speeding up of the process of giving the individual a greater degree of participation in the federal government . . . Watergate warned us of the dangers of a powerful centralized government — a suppression of privacy, widespread use of electronic surveillance." Richardson argued that the federal powers should be subdivided, "even if it reduces the efficiency of government, but it's unlikely that we'd have to pay that cost." Commenting on the course of the Watergate investigation since his resignation last October, when he refused to fire special prosecutor Archibald Cox, Richardson concluded that "we've seen that the Constitution system of two hundred years ago is working well. The courts and Congress are playing their proper roles. Congress is doing a particularly creditable job in avoiding partisan politics."

Richardson spoke at WPI as one leg of a marathon commencement-speaking tour which saw him at the University of Massachusetts and Yale before WPI, and at the Worcester Foundation for Experimental Biology afterwards.

Reunion

REUNION THIS YEAR attracted nearly a thousand people to the WPI campus, by the time the families of returning alumni were all counted. Along with many individual class functions, the Association sponsored a Friday night "Good Old Days Get-Together" with beer, peanuts, and banjo music. A day-long seminar on "Changing American Values" had been scheduled, but this had to be canceled because not enough people registered to make the program possible.

On Saturday, Reunion Day, some 450 people turned out to visit with one another, tour the campus (including car-free West Street), and attend the annual Reunion luncheon. At that time, the Class of 1924, celebrating their fiftieth anniversary, walked away with the attendance cup (and the accompanying bottle of champagne) for having 75 percent of the living class members there.

One of the important events of the day is the presentation of the annual awards. Recognition for dedicated service to WPI and the Alumni Association, in the form of the Herbert F. Taylor awards, was given to *Chester F. Inman, '14,* one of the founders of the Alumni Fund and a man long concerned with investment returns from Association funds; to *C. Eugene Center, '30,* architect of the current alumni trustee selection process; and to *Luther C. Leavitt, '34,* an active chapter leader, Council and Fund Board member.

Robert H. Goddard awards, for outstanding achievement in their professional life, were presented to *Howard C. Warren, '42,* an entrepreneur who started an instrument company in his basement and parlayed it from there until he is now board chairman and chief executive of the Riley Company; to *William R. Grogan, '46,* WPI's dean of undergraduate studies and one of the guiding lights of the WPI Plan's design and development; to *Ravindra L. Kirloskar, '38,* founder of the largest electrical equipment firm in India and a leader in his country's economic and industrial development; and to

George R. Rich, '19, honorary DEng '48, an engineer instrumental in the design and building of the Tennessee Valley Authority, the Saint Lawrence River Power Development, and many other steam power plants, flood-control facilities, and hydroelectric developments.

Association officers for the coming year include the following elections and reelections: Walter J. Bank, '46, reelected president; William A. Julian, '49, vice president; Leonard Polizzotto, '70, member-at-large of the Executive Committee; Bradley E. Hosmer, '61, reelected to the Executive Committee; Walter J. Charow, '49, reelected to the Fund Board; G. Albert Anderson, '51, newly elected to the Fund Board; Paul W. Bayliss, '60, Trustee Search Committee; and Stephen J. Hebert, '66, still secretary-treasurer.

The week before, the WPI Board of Trustees welcomed two new alumni trustees and reelected a third. The returning trustee is John E. Hossack, '46, vice president and director of the American Appraisal Company of Milwaukee, Wisconsin. Hossack has been a WPI Board member since 1964 and is chaiman of the Board's Finance Committee. The new trustees are C. Marshall Dann, '35, currently U.S. Commissioner of Patents in the Department of Commerce, and Hilliard W. Paige, '41, chairman and chief executive officer of CML Satellite Corporation and until last year president of General Dynamics Corporation.

Immediately above, Richard Burke, '38, is shown talking with Ravindra Kirloskar, his classmate. Burke retired as chairman of the Alumni Fund Board after six years of leadership.

1912 — 62nd

It may be that 1912 has come to the end of an era. We had only three at our reunion: Henry and Madeline Rickett and Harrison Brown. But we increased the party 33% by adopting Joseph K. Schofield, 1909, for the evening.

From letters received from 16 of our 24 living members and from 11 of our 20 widows, we find there is still a lot of life in the class. Only a few are in poor health. But many have given up or reduced driving a car, especially at night. Those who live 1000 or more miles away are reluctant to make the trip.

At our 50th in 1962 we invited our wives for the first time and spent two full days at Northfield. We then voted to meet every year with our wives, also widows of our deceased classmates. For eleven years we have had a minimum of 8 at these reunions. We consider this a success. Next year we may have an informal meeting but as long as we get letters from two-thirds of our members, our spirits our running high.

Harrison G. Brown
Secretary

1914 — 60th

The day arrived! Warm, sunny, beautiful, with just a gentle breeze to make the sun feel even softer. What could be more lovely than this, our day in June? It was Friday, the seventh of the month in 1974, and some of the Class of 1914 were arriving with their wives at the Copper Lantern Motel in West Brookfield, the same place that we celebrated our last reunion five years ago. Impossible but true, that this was our 60th year out of Tech. The busy eventful years had slipped by so fast and here we were old only by recorded time, but still young in spirit.

Most of us arrived in the morning early enough to sit outdoors in earnest, interesting conversation on the lovely spacious lawn that sloped gradually down to the Quabog River in the distance. We talked of everything, children, grandchildren, families, former professors and about how different was the world of 1974 compared with 1914.

To make our discussions more relaxing, and perhaps more interesting, our genial and generous Class President, Mike Dufault, invited us to use his room, which was adequately stocked with various beverages such as, gingerale, coke, soda water, and some other colored concoctions. This helped out our thirst and our tongues, and contributed to a sense of complete well being and enjoyment. As we left Mike's room for the last time before lunch, it appeared that some of the colored fluid containers were empty, whereas the gingerale, and the coke bottles had hardly been disturbed.

Sixty years? Well perhaps those of us who are left deserved that friendly relaxing and wonderful time together. Lunch at Salem Cross Inn, a little way up the road, was enjoyable and good. Our tongues continued to wag because we had so much to say to each other and we sat at the table long after our food was consumed.

The afternoon conference again on the lovely back lawn was perhaps a little less talkative until the official photographer, whom Mike had arranged for, arrived in the late afternoon to record our gathering on film.

Our dinner, again at the Salem Cross Inn, was quite an affair, good food, excellent service, and congenial classmates and wives to communicate with. The following sixteen people were present: Win and Mary Brown, Horace Cole, Al and Matilda Crandon, Mike and Chris Dufault, Bud and Dorothy Hennessy, Earl Hughes, Chet Inman, Kirt Marsh, George Ross and his daughter-in-law Helen Ross, Bill and Frances Spratt.

Following the dinner, Mike Dufault called the roll of the class, just as "Coombsie" (Prof. Coombs) used to do it in our Freshman year. With only ten men to answer "Here", out of the hundred plus who formerly replied, we had an opportunity for deep thought, and another chance to thank God that we were indeed alive and "Here". We stayed at the table a long long time discussing many things, our absent classmates, our former professors, and our new and changing College of today, and tomorrow. What will Worcester Polytechnic Institute, our Alma Mater, be like in the years to come? Who knows? But assuredly we will not be here to find out.

Letters were read from some of our interested but absent classmates. They sent their best wishes for a Happy Reunion and explaining that they were with us in spirit, if not in body. A second letter was received from Si Zung Yang, who came to Tech in 1914, originally from Mainland China, and now living in Taiwan, some 12,100 miles away. He told Mike that he celebrated our Reunion by eating a "boiled duck's foot" for dinner. "It is simple," he says, "but is considered a gourmet item here in Tapei, Taiwan." How we wish that Yan and our other absent class members could have been with us.

Following a good breakfast at a nice little restaurant in the town the next morning we assembled on the campus in the lobby of Harrington Auditorium for the 11:00 a.m. 50 Year Associates Meeting. President Hazzard interestingly addressed the group as did the young, personable and energetic president, Bill Delphos, of the Class of 1974. Bill's remarks to the old graduates were concise, to the point, and worthwhile. His delivery was friendly, clear, impressive and most remarkable.

It was our pleasure to find Clayt and Marion Wilcox at the Reunion Luncheon. We were sorry not to have had their company in West Brookfield.

All members of the 1914 Class were proud to rise in tribute to Chester M. Inman, as he was presented an award from the Head Table by the College for "Sixty Years of an uninterrupted carrer of service to WPI." Chet, our Class extends its best wishes to you with very great pride in the honor you have received for your worthwhile achievements for our College.

For this 60th Reunion we owe a great deal of gratitude to our energetic and hard working President, Mike Dufault, for what he did, and he did it all, to make the reunion a success. Indeed, we owe him our thanks for all of his work in presiding over our class for the entire sixty years. He has been an excellent President, an efficient executive, a charming gentleman, a good friend, and a real nice all around guy. Mike, we love you and sincerely thank you.

To those of the Class of 1914 who could not come to this Reunion, and to those of you who have never come, we send our best wishes. As Win Brown so sincerely put it "we ask for God's Blessing upon you all."

Ellwood N. "Bud" Hennessy
Secretary

1924 — 50th

The 50th anniversay class of 1924 were graciously entertained with a cocktail hour given by President and Mrs. Hazzard on Thursday, June 6th, 1974. Orchid corsages for the ladies added a festive note. The reception was followed by a banquet in the feudal atmosphere of the Higgins House given by WPI in honor of the occasion. President Hazzard, introduced by the Alumni Secretary, Steve Hebert, welcomed the class and brought us up to date on the present operation of the Institute. The booklet, edited and printed by Don Wilson and Les Hooper, containing the history of our class was distributed by Les Hooper. This will be made available to all class members. They contain the available resumes of the entire class.

Travel by bus between appointments had been thoughtfully provided by the Alumni Association.

Buffet luncheon was served at Morgan Hall, at noon on Friday, June 7th. This was followed by a walking tour of the campus. The Harrington Auditorium brought back many memories of the old Gym. The new bowling alleys, with a champion bowling team, were a far cry from the two alleys we remembered. The campus tour ended at the Seminar Room, Gordon Library. Some members went from here to the Worcester Art Museum, while the rest met with Roger Perry, Director of Public Relations and Prof. Roy Bourgault. They explained the WPI Plan and the operation of the IPI program. A good question and answer period followed.

We gathered for our 50th reunion class picture at the Sheraton, Yankee Drummer Inn. From left to right, standing; M/M Ronca, Gallotte, Terry Counihan, M/M Bragg, M/M Storms, M/M McElroy, M/M Johnson, Nilson, Bartlett, Estes, M/M Danielson & M/M Burke. Front row; M/M Hooper, M/M MacAdam, M/M Leyland, M/M Alberti, M/M Hurd, M/M Miller, M/M Wilson, M/M Anderson. Present but not in picture M/M Wilcox & M/M Kallander. M/M Preston Hale and Warren Fish with guest attended the Alumni Dav Dinner

Following the reunion banquet a meeting was called by Helge Johnson. The following motions were approved: (1) the balance of all class funds would be turned over to the Alumni Association by the treasurer after all bills had been paid; (2) it was voted that the class gift be given to the Alumni Association to be used at their discretion; (3) also voted that the present class officers would propose a new slate of officers, the slate to be mailed to the class membership for their consideration. There was a discussion of future reunions and five year periods were agreed upon. A letter was read from Dorothy Styffe, widow of Jack Styffe, regretting that she could not be with us but sending the class of 1924 her best wishes. Letters were read from Lionel Lundgren and Frank Linsley. Each member and their wife spoke briefly. Mrs. Alberti added this bit of wisdom: "I can see through my bifocals, my dentures suit me fine, I can live with my arthritis — But how I miss my mind!"

We attended our first 50 year Association Meeting on Saturday and received our 50 year diplomas at the Reunion luncheon held in Harrington Auditorium. The class gift was presented by Norm Alberti. We received the best attendance cup.

All arrangements for this successful, enjoyable reunion were made by one of our busiest members, Dr. Leslie Hooper. We were grateful for the cooperation and help given to us by Steve Hebert, Alumni Secretary and by his staff. Please notify them of any change of address.

Don Wilson

1929 — 45th

When the preliminary Reunion meeting was held last Fall, no one dreamed that we were on the verge of an energy shortage. Then during the winter, there were times when it seemed that there might not be any Reunions. Fortunately, by June, the situation had eased, so that we were able to count 38 at the banquet. Attending were: Berry, Cook, O'Connell, Gilbert, Richmond, Heald, Crosby, Petrie, Carlson, Deranian, Donahue, Horton, Barnard, Matson, and Labonte, all with their own wives. Alone were Dobie, Wiley, Wiesman, Robinson, Newton. In addition it was with real pleasure that we were able to welcome Bea Merrill, Norm's widow. Stone, Nims, and Abadjieff were able to make the General Alumni Reunion Luncheon Saturday Noon. The Berrys, who drove up from Florida, take the prize for distance, and are to be congratulated. The weather was perfect both days. For the first time, Art Knight was unable to attend because of his health. We sincerely hope that he will continue to improve, and will be with us at the 50th. Another sad note was the realization that 24 of our classmates have passed on, 8 since the last reunion. This year, some traditions were pushed aside in order to afford as much time as possible for visiting with each other. We did not have any entertainment nor speakers. Even then, the time passed all too quickly. After Dinner, each in turn gave a summary of current activities. At one time, the interest was in the growing families. More recently, grandchildren were at the center of the stage, Now, it is how retirement time is being spent. It seems that almost everybody has retired already. In fact, those of us who are still working feel a little out of step. How times change. Letters and notes of regret were received from Knight, Cushman, Clapp, Chin, Holt, and Burr. Burr is now head of the mechanical engineering department at the University of the Americas, Puebla, Mexico. He would be happy to see anyone who happened to be in that area. He has been traveling all over the world, teaching and lecturing in South America, India and Australia. Many of the retirees are also becoming world travelers, with trips to all parts of North and South America and Europe. Time was taken for elections. Wiesman was elected Chairman of the 50th; Horton, Chairman of the Gift committee, and to round out our slate of officers, Barnard was elected Vice President. A big vote of thanks is due the committee for their willing efforts during these trying times: Wiesman, Donahue, Deranian, and O'Connell. Each Reunion seems better than the last and the pleasure of seeing old classmates increases every time. We look forward with great anticipation to the 50th. We are sure that everyone who possibly can, will be there.

1929

1949

1919

1944

1924

1939

1944 – 30th

The Class of 1944 began its 30th reunion activities on Friday evening, June 7, at the "Good Old Days Get Together" held at Morgan Hall. This gave us a chance to unwind, renew acquaintances, and sing and dance to a banjo band.

Saturday, June 8th, proved to be another beautiful day with various activities lined up for us plus other activities that came up including a heralded tennis match between the Roths and Clayton-Terpo. Our 30th reunion dinner was held at the Worcester Country Club, preceded by a cocktail hour by the pool, giving us another opportunity to renew acquaintances with those who arrived on Saturday. After sitting down to a delicious roast beef dinner, Jim Donahue opened the reunion meeting in his usual rare form. Our speaker, Tom Denney, brought us up to date on WPI today in a most interesting and humorous way. Len Israel was responsible for all of the banners, signs, tags, and hats which livened up festivities. John Patterson was responsible for the awards and prizes made that evening, and they were outstandingly unique. Following the meeting we were invited to attend a floor show, and this was followed by dancing to conclude the evening. For those real hardy souls who stayed on, and there were a large number, we sang to Jim Donahue's piano accompaniments into the wee hours of the morning.

Members of the class in attendance were: Gordon Anderson, Roy Baharian, John Bateman, Tom Bombicino, Dave Clayton, Charlie Cooper, Jim Donahue, Roger French, Len Israel, Bud Holbrook, Erl Lagerholm, Dick Merrell, Bill Raymond, Miles Roth, Dick Russell, John Patterson, Kim Woodbury, and Chris Terpo. For all of you unable to attend, our deepest sympathies! Your regrets and greetings were read to the class.

See you at the next reunion!

Christopher T. Terpo
Chairman

1949 – 25th

Over one hundred Forty-Niners, wives, sons and daughters from near and far found their way to Boynton Hill on Friday, June 7th to begin a reunion that was to be one of the greatest WPI reunions of all time. At the "Good Old Days Get-Together" at Morgan Hall "change" was the main topic of conversation. "Tremendous" was the adjective most used to describe the changes that have taken place on the Tech Campus. "You haven't changed a bit" was the greeting most commonly voiced to one another by the slightly graying, slightly balding and slightly overweight Forty-Niners.

Saturday was an active day with tours arranged for the campus, the art museum and the science museum. Swimming dominated the informal activities. At the reunion luncheon our good President, Jim Adams presented our class gift to the school. Our class gift exceeded $23,000.00 and was the largest class gift ever given to our Alma Mater. Congratualtions must be given to Steve Spencer, Walt Charow and Jim Adams for the hard work expended in raising this money. Nor should we forget any Forty-Niner who pledged and gave to this great cause.

Saturday night provided a fitting climax with Dr. and Mrs. Hazzard acting as perfect hosts with a cocktail party par excellance at their home. After posing for a reunion picture in Higgins House garden a gourmet roast beef dinner was served in the Great Hall.

After dinner and before the music and dancing lingered on into the night, Jim Adams refresed our memory of the great events of twenty-five years ago, reminiscing about such old landmarks as the Boynton and the Blue Marlin.

Since no reunion would be complete without bestowing recognition of the accomplishments of class members a limited number of awards were made. Paul Feeney received the first award for becoming a father most often. Dean Amidon received an award for having children who made him a grandfather most often. Hugh Robinson and Fred Brennan were honored for traveling the greatest distance having both come from California. Allen Campbell was recognized for driving the greatest distance from Melbourne, Florida. This award was challenged unsuccessfully by Bob Lawrence who drove his airplane from Boulder, Colorado. The final award went to our own Yul Brynner, none other than Moe Nirenstein, for having the cleanest shaven head.

Bob Pritchard and his wife were guests at our reunion dinner. Ken Scott and Bill Grogan and their wives also stopped by to extend their greetings to us. It should be mentioned that Steve Hebert and the girls in the Alumni office did a great job of putting together all the details that contributed to a great reunion.

1959 – 15th

Twenty-two members of the class attended their 15th reunion on June 7 and 8.

Most of us began the weekend at the Good Old Days Get Together on Friday evening and after a few beers together, wound up at Worcester's famed El Morocco.

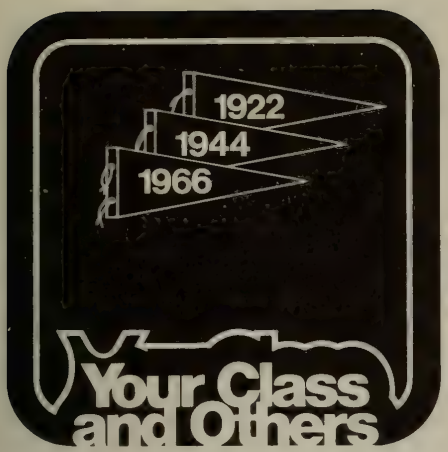
On Saturday there were some who arranged to take the campus tour and were much impressed with the improvements made over the last few years.

Saturday evening was started with a social hour at 6:p.m. and followed by a well prepared banquet at the Wachusett Country Club. After the food was served, we all got a chance to summarize our travels and good fortunes of the past fifteen years.

Our good fellowship didn't stop there for we were all invited to Bob Kelly's house after the banquet to taste some home-made wine prepared and served by Ed Fenny. I'm sure that Ed's talents have never been more appreciated.

Those attending the weekend festivities were: Mr. & Mrs. Richard Bratt, Mr. & Mrs. Lee Courtemanche, Mr. & Mrs. John Gale, Mr. & Mrs. Michael Gasek, Dr. Frederick H. Lutze, Jr., Mr. Norman Monks, Mr. & Mrs. Edward Saulnier, Mr. & Mrs. David Sawin, Mr. & Mrs. George Schreiner, Mr. & Mrs. Edwin Fenny, Mr. & Mrs. Robert Berg, and Mr. & Mrs. Robert Kelly.

1959



1915

MAURICE G. STEELE, who retired 15 years ago from Rome (N.Y.) Cable, then formed and sold his own successful firm, M. G. Steele, Inc., is again retiring. For five years he has been serving as a salaried consultant to his former firm, but he is now making retirement more or less official. He will, however, be available for further consultation.

"Reese," as he is known to his friends, is still on the go. Currently he is historian for the Rome Rotary Club, of which he is a past president. An art enthusiast, and former tenor soloist, he is also an accomplished magician and has given a number of professional performances.

One of his best professional performances was his development of an electric brazer for joining sections of copper wire by soldering, a device he perfected and patented through research at Rome Cable and later at M. G. Steele, Inc. The brazer, which is still the leading product of the Steele Company, is superior to other methods of joining wire in its precision and in the resulting tensile strength of the joint, which is greater than that of the wire itself.

1923

Dr. PAUL R. SWAN, former associate dean of admissions and students at WPI and the retired president of Leicester (Mass.) Junior College, recently moved into an apartment in Winter Park, Fla. He writes that he and his wife are enjoying life and the Florida climate.

1926

RUDOLPH T. DANSTEDT, assistant to the president of the National Council of Senior Citizens, Inc., Washington, D. C., has been appointed to the Statutory Social Security Advisory Council. The council reports to Congress on the financing, scope, and adequacy of the benefits of the Social Security program, Old Age Insurance, and Medicare.

Mr. Danstedt was also appointed a public member of the key Committee on Finance which will review the actuarial and tax aspects of the Social Security program. The committee is a 13-man statutory body which is composed of a chairman, three representatives of employers, three representatives of employees and six public members.

1928

FORREST S. NELSON has been elected a member of the Corporation of the New England Baptist Hospital in Boston. Currently he is a real estate consultant to the First Federal Savings and Loan Association, Worcester, which he has served for over 40 years as senior vice president, director, and chief appraiser. He belongs to the American Institute of Real Estate Appraisers, the Society of Real Estate Appraisers, the Worcester Economic Club and the Worcester Board of Realtors. The New England Baptist Hospital is known internationally for its treatment of complicated medical and surgical problems.

LEONARD M. OLMSTED, formerly a senior editor at McGraw-Hill Publishing, Inc., New York City, retired last year.

George Rich, Distinguished Engineer

The Engineering Societies of New England have presented George R. Rich, '19 with the Distinguished New England Engineer Award at a luncheon ceremony which was held in Boston to highlight Engineers' Week.

The 32nd recipient of this award, Mr. Rich is senior vice president of Chas. T. Main, Inc., professional engineers based in Boston. He has overall responsibility for the firm's activities in the hydroelectric, thermal power, and electrical transmission and distribution fields.

The Distinguished New England Engineer Award is presented annually to "a living engineer, resident of New England who, by outstanding achievement, merits recognition of his accomplished works as well as his character by his fellow engineers of the New England states."

During a career spanning 55 years of engineering and managerial activities, Mr. Rich has contributed to the design and/or construction supervision of such major projects as: the Passamaquoddy tidal power project, the Cornwall pumped-storage project, the Niagara power project, and the St. Lawrence power project. More recent projects in which he has been involved include: the Blenheim-Gilboa pumped-storage power project and the Bear Swamp pumped-storage project.

Mr. Rich is licensed as a Professional Engineer in 33 states and by the National Bureau of Engineering Examiners. Before going to Main, he was chief design engineer for the Tennessee Valley Authority, in charge of engineering for all hydroelectric, steam-electric, and other power work undertaken by TVA.

In addition to his involvement in numerous international power projects for Main, Mr. Rich has also represented the United States as a member of this country's delegations to the International Commission on Irrigation and Drainage, and the International Commission on Large Dams.

Mr. Rich has lectured on hydraulic engineering at Columbia University and served as the Gordon McKay Visiting Lecturer in Civil Engineering at Harvard University. In publishing activity, he authored the book, *Hydraulic Transients*, and has contributed technical papers to numerous professional journals and trade magazines.

Among the professional societies, Mr. Rich is an Honorary Member of the American Society of Mechanical Engineers, and of the Boston Society of Civil Engineers, a Fellow of the American Society of Civil Engineers, and a member of the American Institute of Consulting Engineers. His memberships in honorary societies include Sigma Xi, Tau Beta Pi, and National Honor Member of Chi Epsilon. He was also awarded an Honorary Doctorate of Engineering from WPI in 1948 and presented with the Rickey Medal Award from the American Society of Civil Engineers in 1968. This year he received the Robert H. Goddard award from the WPI Alumni Association.

1929

FRANK R. JOSLIN, the former vice president of New England Electric Systems and Power Service Co., Boston, has retired. . . . HALBERT E. PIERCE, JR., who was with Northeast Utilities, New England Power Planning, West Springfield, Mass. for many years, is recently retired.

1930

WILLIAM W. LOCKE, professor of electrical engineering at WPI, who had served 44 years on the faculty, retired in June. . . . DONALD R. SIMONDS, past vice president of Beloit (Wis.) Corp., retired in February. . . . RALPH H. GILBERT is presently employed at Modern Concrete Pumping Co. in West Hartford, Conn.

1931

WALLACE N. BAILEY, JR. retired in June. He was with Northeast Utilities Service Co., Hartford, Conn., where he served as a system operations coordinator. . . . FRANK S. FINLAYSON, professor of mechanical engineering at WPI, also retired in June. He joined the faculty in 1937 and received his MSME from WPI in 1945. . . . GEORGE RAK is a retiree. He was with Pratt & Whitney Aircraft, East Hartford, Conn. . . . MICHAEL C. SODANO, who has been serving as president of Asian Economic & Tech Service Co., Tokyo, Japan, is now chairman of the board of the company and is currently located in Scottsdale, Arizona.

1932

WILLIAM F. REARDON has retired from General Electric's real estate and construction operation after 25 years. This operation handles the design and construction of major facilities for GE worldwide, with an annual volume in excess of $150 million. During his career at GE Mr. Reardon held positions of manager-construction, manager-engineering, and manager-advanced facilities planning.

1933

HUGO P. BORGATTI retired from Uniroyal, New York City, this summer. . . . ALBERT H. ENSOR recently retired from New England Electric System as superintendent of communications and controls after 39 years of service. Currently he is located in Brewster, Mass.

1934

B. "GUS" LARSON retired in April. He had been a staff assistant at New England Power Service Co., Westboro, Mass.

1936

ROGER W. BRUCE, who is retired as general superintendent from United States Steel Corp., Worcester plant, is a candidate for the Republican nomination for state representative in the 20th Worcester District. He is a former member of the Worcester Planning Board and the Central Massachusetts Regional Planning Commission. He is past president of the Worcester County Republican Club and president of the Worcester Area Mental Health Association.

1937

ARTHUR P. MOOSSA works for American Optical Corp., Southbridge, Mass. . . . DANA W. WOODWARD is now president of American Shoe, Division of Katy Industries, Wakefield, Mass.

1938

THOMAS M. BONNAR, assistant vice president and director of administrative services of the Eastman Kodak Company, was recently elected president of the Genesee Hospital Board of Governors in Rochester, N.Y. . . . Presently DONALD L. MILLIKEN is employed at Bechtel Corp., San Francisco, Calif. . . . THOMAS E. O'NEIL, western manager-business development for Chemical Construction Corp., New York City, is now located in Phoenix, Ariz. . . . MAURICE PRESSMAN has been nominated for the Commander's Award for Technological Achievement at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. The award is given for science, leadership, and

support and is considered the most prestigious the Center can present. Nominated by the Military Technology Department, Mr. Pressman was cited for his work as an analytical chemist in the Sanitary Sciences Division leading to the development of new and original water treatment processes enabling kitchen, laundry and shower waste waters to be reused for nonconsumptive purposes. . . . FRANCIS B. RITZ works for Pittsburgh-Des Moines Steel Co., San Jose, Calif.

1939

CHARLES W. CUMMINGS, who has retired from Pacific Telephone & Telegraph in Los Angeles, Calif., is now raising show cats. . . . DONALD E. HOUSER serves as assistant to the president of Bostik Division, United Shoe Machinery Corp., Middletown, Mass. . . . RICHARD J. MULLER works for Tucker Assoc., East Longmeadow, Mass.

1940

LEWIS F. BEHRENT is with Laboratory Equipment Sales & Service in Renton, Wash. . . . Dr. WALTER E. CRANDALL holds the position of vice president-manager at Corporate Laboratory, Hawthorne, Calif. . . . H. ROGER ERICKSON is personnel manager at Worcester County Institution for Savings, Worcester. . . . ROLFE G. JOHNSON, a self-employed consultant, is currently with Crawford & Russell, in Grangemouth Stirlingshire, Scotland. . . . PHILIP LEVINE works as a supervisor for the U.S. Postal Service in Worcester. . . . JUDSON D. LOWD has been named president of C-E Natco (National Tank Co.), a Tulsa-based subsidiary of Combustion Engineering, Inc. As chief executive officer he will direct the operations of the company's domestic manufacturing, sales and service facilities and its five international subsidiaries located in Canada, United Kingdom, Australia, and Singapore. Lowd, who belongs to ASME, the Institute of Petroleum (London), and is a trustee and member of the Academic Board of Management, Beirut University College in Lebanon, formerly served as executive vice president of C-E Natco. . . . CHARLES C. McDONALD, who has retired from the U.S. Civil Service, writes that he is "Enjoying the warm Florida weather in the brand new house I designed."

Prof. LAWRENCE C. NEALE, director of WPI's Alden Research Laboratories, has won the Worcester Engineering Society's 1974 Scientific Achievement Award. . . . FRANK G. GUSTAFSON, senior product engineer with Bay State Abrasives Division, Dresser Industries, Inc., Westboro, Mass., was a featured speaker at the 13th Abrasives Conference held in Philadelphia, Pa. in June. His topic was "High Wheel Speeds in Precision Grinding." He has had wide experience in the grinding wheel industry both as a manufacturing process engineer and product engineer, and has written numerous articles on grinding wheel applications.

1941

DONALD E. SMITH, president of Smith, Legge & Darcy, Inc., Rochester, N.Y., was recently reelected to a three-year term on the Genesee Hospital Board of Governors. . . . ROBERT F. WILSON is employed by Field, Eddy & Buckley, Springfield, Mass.

1942

JOSEPH N. CHRISTIAN is a realty salesman for Apple Valley Rancheros, Apple Valley, California.

1943

ARNOLD R. JONES has been promoted to divisional vice president and general manager of the Abrasive Materials Division at Norton Co., Worcester. He was divisional vice president and general manager of engineering and construction services. In his new position he will be responsible for the worldwide operations of the division. A registered professional engineer, he is also a director of Worcester Episcopal Housing Corp. and a member of the Governor's Business Advisory Task Group on the Energy Crisis. . . . J. FRANCIS SULLIVAN is a purchasing agent at Scott Graphics, Inc., Holyoke, Mass.

1944

Currently JAMES W. DASHNER is chief product engineer for Consolidated Brass Co., Matthews, N. C. . . . MARTIN J. REILLY works as a product engineer at Allis-Chalmers Corp., Jackson, Mississippi. . . . RALPH D. SCHULTHEISS has been appointed vice president-engineering, Engineered Machinery Group, York Division, Borg Warner Corp., York, Pa. . . . HERBERT E. SHELDON is with the American Telephone and Telegraph Co., New York City.

1945

PAUL A. MARSHALL, JR. works at Brockway Glass Co., Inc., Brockway, Pa. . . .ROGER N. PERRY, JR., WPI's public relations director, has been accredited by the Public Relations Society of America. Of the 7,200 professionals who belong to PRSA, only 2,459 are accredited. PR programs directed by Roger have won four national awards in recent years. . . . KNOWLTON P. RICE is a contractor with Falcon Research & Development, Denver, Colo.

1946

EARL J. BALKON is a general manager at Resurrection Cemetery in Grand Rapids, Mich. . . . CUSHING C. BOZENHARD, president of the Bozenhard Co., Inc., Worcester, was recently elected a trustee of Memorial Hospital. A registered professional engineer, he has served as past president of the Exchange Club of Worcester and is a director of the Friends of Goddard Library. He is also on the advisory board of the YWCA. . . . CHARLES D. CUMMINGS works for Atlas International, Inc., Littleton, Colo. . . . WILLIAM R. GROGAN, dean of undergraduate studies at WPI, participated in dedication ceremonies marking the opening of the new international headquarters of Phi Kappa Theta Fraternity in Worcester last May. Dean Grogan is a past national president of the fraternity. . . .

GORDON A. HOLLIS works for Mobile Pipe Line Co., Mobil Oil Corp., East Douglas, Mass. . . . HAZEN L. HOYT III is with Duplicon, Newport Beach, Calif. . . . VINCENT M. LaSORSA serves as assistant marketing manager at Dynell Electronics Corp., Melville, L.I., N.Y. . . . CARLTON G. LUTTS is product manager, USM Corp., Beverly, Mass. . . . FRANK L. MAZZONE presently holds the position of manager of engineering at Bechtel, Inc., San Francisco, Calif. . . . Col. IRVING T. McDONALD, JR., USAF retired, is now residing in Deland, Florida. Formerly he was assistant chief of staff/intelligence at USAF HQ, Pentagon, Washington, D.C.

CHARLES B. MICZEK, former assistant engineering manager at Stone & Webster Engineering Corp., Boston, has been named vice president of the corporation. Associated with the firm since 1946, he has also been appointed engineering manager. . . . Dr. PETER B. MYERS is director, advanced systems analysis office, at Magnavox, Silver Spring, Md. . . . EDWARD R. STOKEL has been promoted to a new high-level staff position, director of public transportation at GMC Truck and Coach Division of General Motors, Pontiac, Michigan. Formerly he was assistant general sales manager in charge of coaches. In his new position he will be responsible for coordinating GMC truck and coach activities related to public transportation with engineering, manufacturing, product planning and sales operations. . . . MALCOLM K. WHITE is employed by Dutchess Shoe, Salem, Mass.

1947

PAUL H. MUGFORD is a foreman at A. C. Lawrence Leather Company, Peabody, Mass.

1948

FRANK S. HOLBY serves as supervisor-conpensation at GAF Corp., in Birmingham, N.Y. Previously he was with General Electric. . . . STURGIS A. SOBIN, the former mayor of Ansonia, Conn., was recently appointed executive director of the Connecticut Racing Division. He will be responsible for the planning and supervision for flat and harness horseracing, dog racing, and jai-alai.

1949

RUSSELL P. BRADLAW is a project engineer at Turner Construction Co., New York City. . . . NORMAN E. COTNOIR, who was with Fellows Corp. (Springfield, Vt.) for 20 years, is now with Brown & Sharpe Mfg. Co., North Kingstown, R.I. . . . NEAL W. COX works as a plant engineer at the Connecticut Foundry Co., Rocky Hill, Conn. . . . GEORGE M. DEWIRE is product marketing manager at Martin-Marietta Corp., Orlando, Fla. . . . ROBERT N. GOWING holds the post of director of marketing at New England Electric System, Westboro, Mass.

BERNARD J. KAWECKI is marketing sales manager at Bulova Watch Co. (Systems and Instruments Div.,) Valley Stream, N.Y. . . . GEORGE LEHTO serves as a systems analyst at Vitro Labs Div./Automation Industries, Silver Spring, Md. . . . EDWARD A. LUIZ is a mechanical design engineer at Killmorgen Corp., Northampton, Mass. . . . WALTER J. MUSSONI is with Feecon Corp., Westboro, Mass. . . . DONALD R. SKEFFINGTON works as a self-employed consulting engineer in Ipswich, Mass. . . . Presently JOHN A. SNYDER is employed as a market manager at Union Carbide Corp., Bound Brook, N.J. . . . CLAUDE F. VERAA is with Watkins-Johnson Company, Gaithersburg, Md. . . . BERNARD C. WALSH works as a principal engineer at Polaroid Corp., Cambridge, Mass.

1950

The work of JOHN P. BURGARELLA was used as a reference for the article, "Behind the Lens of the SX-70" which appeared in the December 1973 issue of "IEEE Spectrum". He is the director of engineering for electronic products at the Polaroid Corporation in Cambridge, Mass. . . . JAMES N. DuCHARME has been named chief engineer at Rutland (Vt.) Hospital. Previously he had spent 23 years with the General Electric Company, most recently serving in the Ordnance Dept. at GE in Pittsfield, Mass.

1951

PAUL E. RADASCH serves as branch office manager at Nelson, Haley, Patterson & Quirk, Inc., Greeley, Colo. . . . VARTKES SOHIGIAN is personnel manager for Simonds Cutting Tools, Wallace-Murray Corp., Fitchburg, Mass. . . . JOHN D. WRITER holds the position of sales manager-N.E. region, at Aydin Controls, Ft. Washington, Pa.

1952

JOHN W. DIACHENKO is the chief engineer at Imperial Spring Co., Inc., Milldale, Conn. . . . ROBERT L. FAVREAU was recently installed as the 11th president of the Manufacturers Association of Schuylkill County, Pa. He is manufacturing manager of the Pottsville plant of Exxon Chemical Company, U.S.A. The manufacturing plant, Exxon's largest, produces polyethylene, polypropylene and laminated films. . . . RICHARD C. GILLETTE is vice president of the Telecheck Washington-Telecheck Management in Bethesda, Md. . . .

WAYNE ROBERTSON is not only a senior specialist at Monsanto (Springfield, Mass.), he is also a "specialist" in music behind the footlights. To date he has sung in a number of amateur musical theater productions in the Springfield area including "Ruddigore," "The Mikado," and "The Merry Widow." He also appears with a Simsbury (Conn.) group called the West Bank Pops Singers. While at WPI he was a member of the men's octet.

1953

JOHN R. BLACK is manager of engineering at W. P. Keith Co., Inc., in Pico Rivera, Calif. . . . Currently CARLETON C. COMINS holds the position of product safety consultant at the Foxboro (Mass.) Co. . . . PHILIP A. CHARRON serves as plant manager at Rochester Button Co., Duplan Corp., Wellsville, N.Y. . . . ROBERT B. CRAIG is a programmer at Raytheon Co., Norwood, Mass. . . . GEORGE H. CROZIER, JR. works as director-project management, Monsanto Environmental Chemical Corp., Chicago. . . . R. TAYLOR HOLMES, JR. is with Bay State Abrasives, Westboro, Mass.

ROBERT C. JACINO is currently assistant to the vice president at Charles Pfizer, Inc., New York City. . . . PHILIP J. KAMINSKY works for G. S. Grumman & Associates, Inc., Boston. . . . MARSHALL J. KIDDER is a resident chemist at Philips Labs, Briarcliff Manor, N.Y. . . . DONALD G. POST is now marketing manager at Foster Grant Co., Inc., Leominster, Mass. . . . WILLIAM V. RASZKA works for Colony, Inc., Quincy, Mass. . . . ARTHUR M. SHEPARD serves as manager of projects at Yankee Atomic Electric Co., Westboro, Mass. . . . CHARLES R. SMITH is with C. R. Smith Agency, Manchester, Conn. . . . HERBERT S. PETERSON is now with Dana Corp., Toledo, Ohio.

1954

DAVID K. BEACH, JR. is president of Beach Engineering, Worcester. . . . ROBERT C. PICKFORD is manager/systems and procedures at Warner-Lambert Co., Morris Plains, N. J. . . . MILTON MECKLER, president of Meckler Associates, Los Angeles, Calif., delivered a technical paper, "Peltier Effect Heat Pump System" at the 94th Annual ASME Winter Meeting in Detroit. His firm is currently working on the system's development as a viable alternative to meeting long range industrial energy needs. He writes that his company is also working on the development of a fully earthquake resistant tubular structural system. In April he had a paper describing the fluid logic published in *Hydraulics & Pneumatics* and even more recently he spoke before the Third World Congress of Engineers & Architects in Tel Aviv. Meckler, a registered mechanical and chemical engineer in California, Michigan, Ohio, Hawaii, Guam and Nevada, holds several patents and has written many technical articles and papers.

1955

MARTIN J. BURDEN is currently employed at Schlegel Mfg. Co., Rochester, N.Y. . . . KIRBY S. DUCAYET III serves as administrative manager for Kimberly-Clark Corp., Schweitzer Division, Lee, Mass. . . . ROBERT C. SMOLINSKI works at Zurich Insurance Co., Detroit, Mich. . . . ROBERT C. STEMPEL is special assistant to the president at General Motors Corp., Detroit. . . . ROBERT K. NEUNHERZ has been named production manager of the Fiberloc Division of the Felters Company in Millbury, Mass. Previously he was vice president of manufacturing at GEM Industries, Gardner, Mass.

1956

ERNEST BERNSTEIN serves as assistant chief engineer for Turbo Power and Marine, Farmington, Conn. . . . HOWARD H. BROWN, who has been studying at Boston University, received his doctorate in educational administration in May. Last September he joined the faculty at Southeastern Massachusetts University in the Department of Business Administration. . . . HENRY J. DUMAS, JR. is working at Honeywell, Inc., Lexington, Mass. . . . Dr. RAYMOND R. HAGGLUND, professor of mechanical engineering at WPI, has been selected the outstanding teacher of the year at Tech, the announcement being made at the annual faculty banquet held at Morgan Hall in May. Dr. Hagglund received his master's degree from WPI in 1959 and earned his doctorate at the University of Illinois in 1962. He joined the WPI faculty in 1956 and was one of the prime movers in developing student project activity under the WPI plan.

ARNOLD M. HALL is vice president, engineering at Hovermarine Corp., Pawcatuck, Conn. He helped to found the firm five years ago. The company is the only commercial builder of "sidewall" hovercraft. . . . THOMAS W. HANSEN works at IBM Corp., Boulder, Colo. . . . ROBERT E. KLEID owns and operates Robert E. Kleid Nautical Instruments, Fairfield, Conn. . . . FREDERICK J. LINDSEY is a manufacturing engineer at Dow Corning Corp., Trumbull, Conn. . . . JOHN R. MacHARG is with Sperry Systems, Division of Sperry Rand, Great Neck, N.Y. . . . JOSEPH MORGAN, JR. serves as a dynamics engineer at Raytheon Co., Burlington, Mass. . . . ROBERT V. VIERAITIS is a design supervisor at Perkin-Elmer Corp., Norwalk, Conn.

1957

JOHN D. DALY is employed by the Columbia Gas System, Inc. in Charleston, W. Va. . . . GERALD FINKLE holds the post of president of Wachusett Molding Corp., West Boylston, Mass. . . . ROBERT W. FRANKLIN is a commander with NOAA and is presently stationed in Miami, Florida. . . . DANIEL J. FISHER, JR. has been promoted to project manager in the Fibers and Film Product Group at Leesona Corp., Warwick, R. I. Formerly he was with General Dynamics' Electric Boat Division. . . . CHARLES I. FRIEDMAN works at Prime Computer, Inc. in Wellesley, Mass.

JOHN D. MINOTT is an environmental engineer at Ashland Chemical Co., Columbus, Ohio. . . . ALAN H. MITCHELL is with Turbo Power & Marine Systems, Farmington, Conn. . . . WAYNE E. PENDLETON has been employed at Global Marine Development Co., El Segundo, Calif. . . . ARAM H. SOHIGIAN has been named a senior project engineer in the research and engineering department of Bay State Abrasives, division of Dresser Industries, Inc., Westboro, Mass.

1958

WILLIAM L. BYARS, III works for Signetics, Orem, Utah. . . . JERRY A. COLLAMORE is with Forest Industre (Tele-Comm., Inc.), Eugene, Oregon. . . . Digital Market Assoc., Sudbury, Mass. employs MICHAEL S. GUTMAN. . . . DAVID A. HELMAN serves as a financial analyst at Tecna, Emeryville, Calif. . . . CARL R. JOHNSON works as a senior instrument engineer at Fluor Engineering and Construction, Houston, Texas. . . . ROBERT M. KANEN is with Robert Wager Co., Chatham, N.J.

JOHN H. PORTER works at American Can Co., Greenwich, Conn. . . . JOAQUIM S. S. RIBEIRO, vice president and treasurer of the Jamesbury Corporation, Worcester, has been elected a trustee of Memorial Hospital. He also serves as a trustee for the Central New England Colleges of Technology, corporator of the Worcester County Institution for Savings, and director and treasurer of the Visiting Nurse Association. . . . ROBERT C. SIMMONDS, JR. is head of the design section at United Shoe Machinery Corp., Machinery Division, Beverly, Mass. . . . JOHN B. VESEY is with Excel Industries, Inc., Lakewood, N.J.

1959

The Rev. HARVEY D. EGAN, S.J., who received his PhD from Munster, Germany last year, is now an assistant professor at Santa Clara University in California. . . . ANTHONY E. ENGSTROM is a real estate salesman for Home & Land Co., San Rafael, Calif. . . .WILLIAM N. FELENCHAK serves as a designer with United Aircraft Research Labs., East Hartford, Conn. . . . THOMAS R. KEEFE works for Dennison Mfg. Co., Framingham, Mass. . . . ROBERT W. KELLEY is now manufacturing engineer and production supervisor at the Berlyn Corp., Millbury, Mass., which is a manufacturer of machinery for the plastics industry. Previously he was a consultant and had spent some time at Colt Firearms developing the manufacturing process for two new stainless steel handguns. . . . MARSHALL P. KRUPNICK currently practices law in Hallandale, Florida.

Dr. ALLEN H. LEVESQUE was recently promoted to unit manager at Sylvania Electronic Systems, Needham, Mass. Prior to his promotion he was manager, special communications projects, GTE Labs. in Waltham. He is completing his term as chairman, Boston Chapter IEEE Information Theory Group; serves as a member, Educational Advisory Committee for the Chelmsford (Mass.) Schools; and represents Chelmsford on Nashoba Valley Technical High School building committee. . . . Dr. FRANKLIN SALEK is at the Newark (N.J.) College of Engineering. . . . RICHARD P. SCHOU works as a project engineer with Aberthaw Construction Co., South San Francisco, Calif. . . . LEE D. SMITH, JR. is now a senior supervisor/process for Du Pont in Old Hickory, Tenn. . . . ROBERT F. STRACHAN serves as assistant vice president at Commerce and Industry Insurance Company, New York City. . . . ERNEST F. WOODTLI is principal product engineer at Honeywell, Inc., Ft. Washington, Pa.

1960

GARY AUGERI now serves as a senior engineer in the Guidance and Control Division at Litton Industries, Woodland Hills, Calif. . . . Dr. DOUGLAS E. BRYANT holds the position of sales manager at Foseco, Inc., Cleveland, Ohio. . . . EDWARD P. DONOGHUE is Boston area sales manager for Data 100 Corporation, a manufacturer and distributor of remote computer terminals. . . . WILLIAM J. FIRLA, JR. writes that he is "Back from an enjoyable year in England." He is still with IBM in Boston. . . .

Lambda Electronics of Melville, L.I., N.Y., employs THOMAS A. POOLE as a chief engineer. . . . BRUCE A. MacPHETRES now works at American Telephone & Telegraph, New York City. . . . ALAN T. REED has been named district superintendent for Massachusetts Electric Co., Haverhill, Mass. He joined the company's Worcester office in 1960 and has held positions at the Brayton Point Station in Somerset and in Leominster. Most recently he was assistant district superintendent in Beverly. . . . WARREN J. E. TALBOT works for Varion Associates, Palo Alto, California.

1961

Dr. NORMAN F. BOLYEA is associate professor in the Department of Civil Engineering at the University of Nebraska in Omaha. . . . STEPHEN B. BRODY is production manager at Flambeau Southeast Corp., Monroe, Ga. . . . DAVID M. CHESMEL serves as product manager at West Chemical Products, Inc., Long Island City, N.Y. . . . Dr. HAROLD A. CHRISTOPHER currently works as manager — battery development group at Esso Research & Engineering Co., Linden, N.J. . . . EDWARD F. DOWLING is a manager of advanced design at Babcock & Wilcox, Lynchburg, Va. . . . PRESTON W. HALL, SIM, has been named president of the Knife Division of Rexnord, Inc., in Maynard, Mass. He joined the company in 1973 and had been manager of the Knife Division. He will be responsible for all the activities of the division which manufactures agricultural knives and rotary lawn mower blades. . . . HENRY J. KOSIBA, JR. works at Fenwal, Inc., Ashland, Mass.

DAVID Q. OLSON is a systems analyst at Computer Congerics of Texas in Dallas. . . . Currently DAVID M. RAAB is with Draper Lab., San Diego, Calif. . . . DONALD C. ROOT writes that he recently joined the Terry Steam Turbine Co., Windsor, Conn., as a senior engineer-gear products. The Roots, who reside in Windsor, are the parents of two daughters. . . . Presently DAVID L. ST. ONGE works for United Nuclear Corp., Montville, Conn. . . . Dr. ROBERT E. SEAMON, organist at Trinity-on-the-Hill Episcopal Church, Los Alamos, N.M., presented an organ recital at Wesley Methodist Church in Worcester in May. Dr. Seamon is a staff member of the Los Alamos Scientific Laboratory of the University of California in New Mexico. . . . FREDERIC A. STEVENS is vice president of Vantage Computer Systems, Hartford, Conn. . . . ROBERT STEWART, SIM, teaches at Uxbridge (Mass.) School. . . . PAUL S. SLEDZIK, former president of the Berkshire Chapter of the Alumni Association, is now located in Waukesha, Wisconsin, where he is manager of Waukesha Operations in the Medical Systems Division at General Electric Co. . . . THOMAS P. LOPRESTI, a systems engineer for the Data Processing Division at IBM, is currently located in Omaha, Nebraska.

Sledzik, '61

Krein, '62

1962

Dr. KENNETH J. ANUSAVICE currently serves as an assistant professor in the Dental Materials Section, Department of Restorative Dentistry at the School of Dentistry at the Medical College of Georgia in Augusta. He is also pursuing a course of study leading to a DMD degree. . . . ROBERT J. BAGDIS has been appointed as a member of the Millbury (Mass.) Finance Committee. Presently he is a senior engineer at Norton Co., Worcester. . . . WILLIAM C. BORLA is employed by the Dept. of Transportation, Hartford, Conn. . . . M. PHILIP DeCAPRIO has been appointed to the position of senior engineer at Northeast Utilities in Berlin, Conn. He became a cadet engineer at Connecticut Light and Power Co. in 1965. After serving as an assistant distribution engineer, he was named a division planning engineer in 1970 and in that capacity was on loan to Northeast Utilities in 1973. . . . PAUL R. CULTRERA is assistant to the director of industrial security (corporation fire marshall) at United Aircraft Corp., East Hartford, Conn.

ARTHUR E. DOBRESKI is a senior facilities engineer at Gillette Co., Andover, Mass. . . . STUART C. GILLOW, who is presently located in Mundelein, Illinois, works for IBM. . . . WILLIAM A. KREIN has been named manager, financial section, for General Electric's installation and service engineering department in Schenectady, N.Y. After receiving his MBA from Babson Institute in 1964, he joined G.E.'s advanced manufacturing training program. From 1968 to 1972 he held domestic and foreign audit assignments with the Corporate Audit Staff. His most recent position was that of manager, financial operations analysis, group finance operation for the Power Generation Business Group in Stamford, Conn. . . . RICHARD P. LaJEUNESSE has been appointed product manager for the time-series analysis systems at Time-Data Corp., Palo Alto, Calif. Since 1962 he has held marketing and engineering positions with General Radio Co., of which Time-Data is a subsidiary. Earlier he was assistant product marketing manager at General Radio headquarters.

Presently KENNETH J. LaLIBERTE is a coordinator/ microfilm-micrographics at Eastman Kodak Co., Rochester, N.Y. . . . JOSEPH D. LeBLANC has been appointed assistant plant superintendent at Maine Yankee Atomic Power Company, Wiscasset, Me. He joined the company in 1966 as a technical assistant in the Reactor Engineering Dept. in Rowe, Mass. In 1967 he earned his reactor operator license. In 1969 he became acting reactor engineer and was assigned to the Maine Yankee project. He was appointed reactor and computer supervisor at the Wiscasset plant in 1970 and directed Maine Yankee's initial startup test program. LeBlanc earned his senior reactor operator's license in 1972 and was appointed assistant to the plant superintendent in 1973.

DONALD R. MARCY is with Johnson & Higgins, New York City. . . . JOHN V. MEREGIAN serves as an administrator at Kendall Co., Walpole, Mass. . . . WALTER D. WADMAN has been named district superintendent of operations for the Connecticut Light and Power Co., Bristol, Conn. He joined CL&P in 1963 at Norwalk Harbor. In 1964 he

became a junior engineer at Danielson and an assistant engineer in 1967. Later he was named area operating engineer and area operating supervisor.... STEVEN W. ZIEMBA was recently named principal of John F. Kennedy Junior High School in Springfield, Mass. He was assistant principal and had been acting principal since December. A doctoral candidate at the University of Massachusetts, he formerly taught physics and chemistry at Technical High School and Roger L. Putnam Vocational Technical High School. Prior to his teaching career, he had been an industrial chemist with the U.S. Rubber Co.

1963

WILFRED E. BROWN, III is with the U.S. Dept. of Transportation T.S.C., Cambridge, Mass. ... LAWRENCE N. ESCOTT serves as a systems analyst at Blue Cross/Blue Shield, New York City. ... WILLARD W. GOODWIN, JR. has been promoted to engineering manager-precision products at the Fafnir Bearing Co. (Divison of Textron) in New Britain, Conn. Since 1964 he has worked in application engineering with extensive experience in the custom precision field. He is president of the Avon Secret Lake Association and is a member of the Society of Automotive Engineers.

JAMES M. KELLY, JR. district sales manager, pollution control division at Carborundum Environmental Systems, Inc., is located in Buffalo, N.Y. .... FREDERICK L. KUBICK is working in Sonar Research at Dynell Electronics Corp., Melville, N.Y. .... JOSEPH MANCUSO, of the management engineering department at WPI, has been named to the board of directors of Laser, Inc., Sturbridge, Mass. He is also the president and founder of Applied Marketing, Inc., a management consulting firm. Currently he sits on the board of nine small businesses. ... Dr. and Mrs. R. MICHAEL MALBON and their daughter Beth recently returned to the U.S. after spending two years as private citizens in Chile with the Peace Corps. Dr. Malbon was granted a full professorship and taught in the Electronic Division at the University of Valparaiso and the Naval School of Santiago. Mrs. Malbon taught English to Chilean students at the same university. Dr. Malbon has now returned to his position in the Allied Solid States Division of the Howard Hughes Research Laboratories in Newport Beach, Calif.

KENNETH OLSEN is a patent attorney at Schlumberger Limited, Ridgefield, Conn. .... At present WARREN R. STANDLEY is on leave of absence as a senior engineer at Pratt & Whitney Aircraft, South Windsor, Conn. and is completing research for a PhD at the University of Connecticut. ... In April CARL STOUTENBERG received an honorable mention award for his entry in the 1973 Materials Utilization Contest sponsored by *Production*, the magazine of manufacturing. His entry was slated to be published in the July 1974 issue. A former research engineer at the Stanley Works, New Britain, Conn., he was recently promoted to product line engineering manager of the New Britain Product Line Group. ... CONRAD P. SUPSKI works for Herbert Engineering, Inc., Worcester. ... GERALD D. WAXMAN teaches at Santa Monica (Calif.) City College. ... PAUL E. CAHALEN serves as district manager for Strong Scott Mfg. Co. He is located in Lakewood, N.J.

1964

Married: CARL YOUNGMAN and Miss Joan S. Blackman in Providence, Rhode Island on May 19, 1974. Mrs. Youngman, a graduate of Wheelock College, teaches in Quincy, Mass. The groom is a partner in the management consulting firm of Youngman, Charm and Associates, Brookline.

J. MICHAEL ANDERSON is currently vice president, MBA Communications, Inc., New York City. ... JOSEPH B. BRINKMANN is a senior metallurgical engineer for G.E.-Advanced Technology Operation, Bridgeport, Conn. ... PAUL A. COVEC works at Teradyne, Sunnyvale, Calif. ... RICHARD A. DOWNE is reliability engineer at Fairchild Semiconductor, South Portland, Me.

WALTER J. GONIA, SIM, holds the post of regional sales manager in the Johnson Division of Universal Oil Products Co., St. Paul, Minn. ... Presently WILLIAM S. INGALLS, JR. is marketing supervisor for American Telephone & Telegraph in New York City. He had been with New England Telephone. ... CARLETON F. KILMER, JR. serves as manager, administrative services division, Arthur Andersen & Co., Boston. ... GEORGE KLANDER is with UCAC (Unemployment Compensation Advisory Corp.), Philadelphia, Pa. ... RONALD E. LUBOWICZ works for Distrigas Corp., Boston, Mass. ... Dr. BRUCE MACCABEE is a research physicist in the Naval Ordnance Lab., Silver Spring, Md.

BRUCE A. OCHIEANO is with William Blair, Inc., Los Altos, Calif. ... Dr. ALFRED R. POTVIN holds the position of director and associate professor of bio-medical engineering at the University of Texas at Arlington. ... JOHN C. RYDER is now vice president at Fabricated Machine, Massilon, Ohio. The company designs and manufactures test equipment for the tire industry. ... EDWARD N. SANTOS works as a district sales engineer for General Electric in Detroit, Mich. ... MAURICE R. SILVESTRIS, who is with New Jersey Zinc Co.; Palmerton, Pa., received his MBA from Lehigh University in December. ... EUGENE N. SPRAGUE works at W. N. Sprague, Inc., Leicester, Mass. ... MARIO TAMA is self-employed with Contemporary Builders, Woodstock, Vt. ... PAUL A. LILIENTHAL is owner and president of Aqua Wells, Inc., Thetford Center, Vt. ... Dr. ROBERT A. PEURA, assistant professor of electrical engineering and life sciences at WPI, has been named as an outstanding young leader of Worcester County for 1974 by the Greater Worcester Jaycees.

1965

PETER F. BEHMKE is a project engineer with Fram Corp., East Providence, R.I. ... ROBERT H. CAHILL serves as a product manager at Hilti Fastening Systems, Stamford, Conn. ... ROBERT K. DAWLESS works for ALCOA in New Kensington, Pa. ... MICHAEL S. DEMBSKI is marketing manager at Brockway Glass Co., Inc., New York City. ... RONALD GREENE has been employed at Data General Corp., Southboro, Mass. ... WILLIAM S. HAGAR is a process engineer at General Cable Corp., Pownal, Vt.

ROBERT L. JOHNSON works for IMLAC Corp., Needham, Mass. ... ROBERT D. KLAUBER is studying in Belgium. ... Systems Research Laboratory, Dayton, Ohio, employs PETER E. OBERBECK. ... THOMAS E. PEASE is with Quirk, Lawlor & Matusky, Tappan, N.Y. ... Presently WAYNE D. PONIK is a product manager at Teradyne, Inc., In Chatsworth, Calif. ... HARVEY ROSENFIELD is president of Rosenfield & Associates, Inc., Jamaica Plain, Mass. ... Currently PHILIP B. RYAN serves as a partner in N. F. Bigelow & Co., Manchester, N.H.

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

ROBERT D. SCHLEE works at IBM Corp., San Jose, Calif. . . . Presently ALFRED G. SYMONDS is a senior field service representative for General Electric Ordnance Systems, Pittsfield, Mass. He is on assignment at U.S. Naval Weapons Lab., Dahlgren, Va. . . . MADHUKAR B. VORA holds the post of general manager at Cambridge Memories, Inc., Poughkeepsie, N.Y. . . . Lt. Cmdr. FRANCIS X. WATSON is in charge of construction at the new U.S. naval base in the Indian Ocean (Diego Garcia). He is a project engineer. . . . JOHN H. ZIFCAK, JR. serves as engineering manager at the Foxboro (Mass.) Co. . . . Dr. RICHARD FORTIER has joined Stone & Webster in Boston. Formerly he was an assistant professor in mechanical engineering at Southeastern Massachusetts University. Dick writes that he and his wife, Gail, and son, Jason, now live in Concord, Mass.

1966

Married: DAVID E. WILSON to Miss Barbara A. Davis of Chevy Chase, Maryland on December 15, 1973. He serves as a senior systems analyst for UNIVAC, Washington, D.C.

BORN: To Mr. and Mrs. MICHAEL T. PORTANOVA a daughter, Camy, in July of 1973. He is with Digital Equipment Co., Maynard, Mass.

GARY ANDERSON is a sanitary engineer at Ken R. White Co., Denver, Colo. Last year he received his MS in environmental engineering from Duke University. . . . WILLIAM R. BOND, JR. works as a staff engineer at Chicago Finish Metals, Bridgeview, Ill. . . . Dr. LIONEL A. CARREIRA is an instructor in the Chemistry Department in the University of Georgia in Athens. . . . DENNIS FLANNERY works for the New York Department of Transportation, Albany, N.Y. . . . Currently RICHARD E. GOODELL serves as a plant manager at Pfizer, Inc., Victorville, Calif. . . . JOHN S. JENKINS, who is a staff engineer for Terry Corp. of Connecticut, Terry Steam Turbine, is located in Windsor, Conn. . . . EDWARD A. KAZANJIAN, JR. has been appointed director of school plant for the Brookline (Mass.) Public Schools. Previously he was assistant director in Brookline and assistant director of buildings and grounds for the Framingham Public Schools.

JOHN C. LEE serves as project office engineer at Bechtel Assoc., Washington, D.C. . . . PAUL G. MESSIER works at Consolidated Controls Corp., Bethel, Conn. . . . PAUL F. PETERSON is a technical consultant in Software AG of North America, Reston, Va. . . . The First National City Bank, New York City, employs MELVYN L. SACK. . . . PETER K. SOMMER has joined his father Kenneth R. Sommer, in partnership to continue the practice of patent, trademark and copyright law as Sommer & Sommer in Buffalo, N.Y. . . . Presently ROBERT J. ZAVATKAY works at the Stanley Works, Hand Tools, New Britain, Conn.

1967

Born: To Mr. and Mrs. RICHARD H. COURT, JR., a son, Jonathan Douglas, on December 21, 1973. Dick, who received his MS from Adelphi University last year, was recently named supervisor of quality control for BMC in Danbury, Conn. . . . To Mr. and Mrs. JONATHAN A. TITUS, a son, Christopher Hendrie, on April 1, 1974. Jon has started a business (Titus Labs, Blacksburg, Va.) which is concerned with custom electronic design and computer interfacing. He has also coauthored several recent articles on computer interfacing for *Analytical Chemistry.*

MICHAEL B. BARR works as plant manager at M & T Chemicals, Inc., Elizabeth, N.J. . . . CHARLES L. BLAKE serves as a staff engineer at Helena Chemical Co., Memphis, Tenn. . . . CHARLES T. BLANCHARD is the Republican candidate for the Water and Sewer Commission in Sturbridge, Mass. He holds the post of manager of engineering for the Pneumatic Ejector Division of CPC Engineering Corp. A member of the New England Water Pollution Control Association, he also belongs to the Society of Mechanical Engineers and the Water Pollution Control Federation. . . . WILLIAM F. CARBONI works for Albert A. Web Assoc., Riverside, Calif. . . . ROBERT H. CARON is with TRW, Inc., Redondo Beach, Calif. . . . Rohm and Haas Company, Philadelphia, Pa., employs RICHARD E. DEGENNARO. . . . ROBERT E. DeNIGRIS teaches mathematics at the Masters School in Dobbs Ferry, N.Y.

JOHN F. DOWNES, JR. has been appointed district manager of Fafnir Bearing Company's Detroit sales office. He has been sales manager in the Detroit area for three years and was previously in Moline, Illinois. . . . JOHN A. FACCA is an operating room engineer at Hartford (Conn.) Hospital. . . . JOSEPH G. FERRARA serves as a sales engineer for Mount Hope Machinery Co., Taunton, Mass. . . . Capt. DAVID K. HEEBNER (U.S.A.) is presently attending Naval Post Graduate School where he is studying for his master's degree in Operations Research. He is located in Monterey, Calif. . . . FREDERICK P. HELM works at Hazeltine Corp., Greenlawn, N.Y. . . . PAUL HINKLE is senior buyer at Arrow-Hart, Hartford, Conn. . . .

EDWARD W. PILTZECKER, JR. is with the Foxboro (Mass.) Co. . . . JOSEPH R. PYZIK was recently awarded a $100 savings bond as the winner of an employee contest to name the new unbreakable replacement glazing material being manufactured by his firm, Rowland Products, Inc., Kensington, Conn. He called the new product, *"Perma-Pane."* Pyzik, who is working on his MBA at the University of Hartford, is employed as a general foreman in the Sheet Products Division at Rowland. . . . GEORGE H. RAND, JR. works as a technical salesman at Union Carbide, Tarrytown, N.Y. . . . ERNEST L. SMITH, SIM, chief industrial engineer at the Cincinnati Milacron-Heald Division, recently announced his candidacy for the three-year term on the Auburn (Mass.) School Committee. He currently holds an appointed position on the committee and previously he has served as an elected member. . . . DUNCAN C. VANDENBERG is a manufacturing engineer at Dow Corning Corp., Trumbull, Conn. . . .

ELLIOT F. WHIPPLE has completed the course of study required for a master of science degree at Brown University, Providence, R.I. . . . U.S. Air Force Captain JONATHAN P. WORTHLEY has received his master's degree at the Air Force Institute of Technology at Wright-Patterson AFB, Ohio.

1968

Married: KENNETH A. CRAWFORD to Miss Mona Atallah on December 29, 1973 in Worcester. The bride attended schools in Tripoli, Lebanon and is a cytotechnologist in the Hahnemann Hospital laboratory. Her husband is a research assistant at WPI's Alden Labs and is also a graduate student in the physics department. . . . RONALD F. GOLASZEWSKI to Miss Carole Ann Grace on April 20, 1974 in Fall River, Massachusetts. Mrs. Golaszewski graduated from Bridgewater State College and teaches in Fall River. Her husband is a rate analyst for the Providence Washington Insurance Co. . . . MICHAEL A. DiPIERRO to Miss Jean Marie Mahoney on January 19, 1974 in West Harwich, Massachusetts. The bride is an interior decorator and graduated from Marymount College. The groom runs Polyform Corp., Westboro, Mass.

JOSEPH S. ADAMIK, JR. is a sales representative at Price Brothers Co., Dayton, Ohio. . . . ARNOLD ANTAK, who is a planner-engineer for Howard, Needles, Tammen & Bergendoff, is presently working as assistant project director for the preparation of the Final Environmental Impact Statement for the controversial relocation of Route 2 through Lexington, Lincoln, Concord, and Acton in Massachusetts. . . . JOHN J. BRESNAHAN, JR. works at Norton Co., Worcester. . . . JAMES R. CRABB is general superintendent at M. Rondano, Inc., Stamford, Conn. . . . MARSHALL J. DANA currently serves as a design engineer at Westinghouse Electric, Sunnyvale, Calif. . . . GAETANO DECARO is a production supervisor at Leaf Confections, Ltd., Scarboro, Ontario, Canada.

CARL A. ENGSTROM works for Eastern Refractories Co., Inc., Belmont, Mass. . . . GEORGE F. GAMACHE of Watertown, Mass. was recently appointed construction manager for Star Market which is currently engaged in a vast expansion program. He joined the 59-store supermarket chain as a project engineer in May of 1972. . . . CHESTER J. KASPER serves as a sales engineer at Pearse/Pearson, Bloomfield, Conn. . . . RICHARD KUNG, who received his MS from WPI in December, is now studying at the University of Massachusetts. . . . ROUMEN B. KORDOF, CLU, is a partner in Kordof & Golden Company, Denver, Colo. . . . JOHN J. KORZICK holds the post of account manager at Industrial Nucleonics, Columbus, Ohio. . . . WILLIAM D. MAHONEY is president of Mahoney-Smith, Inc., Union Dale, Pa. . . .

JOHN H. McCABE was recently promoted to assistant treasurer at Hammond Plastics, Inc., Worcester, the country's largest independent manufacturer and distributor of polystyrene. He joined Hammond as director of information systems in 1970. Previously he had worked as a systems engineer and marketing representative at IBM. Jack, who has his MBA from Clark University, is a member of the Presidents' Club of the Worcester Area Chamber of Commerce and a member of the Chamber's Leadership Program. He is vice president of the Worcester County Chapter of the WPI Alumni Association.

Dr. JOSEPH F. OWENS, III is a research associate/lecturer at Case Western Reserve University, Cleveland, Ohio. He received his PhD from Tufts last year. . . . Dr. MICHAEL R. PAIGE works at Sperry Research Center, Sudbury, Mass. . . . Capt. RICHARD G. PERREAULT has graduated from the Engineer Officers' Career Course at Ft. Belvoir, Va. and is now assigned to the Far East Engineer District in Seoul, Korea. . . . JOHN M. PETRIE is the senior project engineer at ESE Limited, Toronto, Ontario, Canada. . . . DAVID B. POTTER has been appointed Central Maine Power Company's local manager in Damariscotta. In 1968 he joined CMP as assistant power sales engineer in the Portland office. In 1972 he became division operations assistant in Brunswick.

WALTER SACKMANN is a sales engineer for the Hope Company, Fitchburg, Mass. . . . RICHARD S. SADOWSKI was recently promoted to manager of the Fuel Burning Engineering Dept. at Riley Stoker Corporation in Worcester. He joined the firm's research and development department in 1968. After serving in Viet Nam and winning two bronze stars and the Army Commendation medal, he returned to join Riley's fuel burning department in 1971. In 1972 he joined the gas cleaning systems department coordinating the engineering of the first fuel-sized utility sulfur dioxide removal system sold by the company. He was co-author of a paper entitled: "An Experimental Correlation of Oxides of Nitrogen Emissions from Power Boilers Based on Field Data," which was presented to the American Society of Mechanical Engineers in 1972. Riley Stoker is one of the country's largest designers and builders of power generating, fuel burning, and gas cleaning systems.

RUSSELL B. SNYDER serves as an instructor in the Department of Business Administration and Economics at St. Michael's College, Winooski, Vt. . . . STEPHEN J. STADNICKI, JR. is a graduate student at Princeton. . . . MICHAEL J. TRUE is a sales and marketing representative for Maine Building Spec. Co., Portland, Me. . . . RICHARD B. VAUGHN, who is with General Electric in Fitchburg, Mass., is also a part-time MBA student at Clark University, Worcester. . . . ROBERT A. WILEY serves as a product engineer for Raytheon Co., West Andover, Mass. . . . EDWARD F. CANNON, former WPI All America soccer player, has been appointed assistant athletic director at Saint Anselm's College, Manchester, N.H. He will also direct the college intramural program, and serve as assistant soccer coach and varsity golf coach. Since graduating from WPI, he has taught math and science at Worcester Academy where he also coached soccer and basketball. In 1972 he was named assistant athletic director of the Academy. That same year he led the Worcester Scans semi-pro soccer squad to the Mass. State Soccer League title.

1969

Married: Lt. DAVID J. PIETRASZEWSKI to Miss Kathleen M. Stochmal on May 25, 1974 in New Britain, Connecticut. The bride graduated from Saint Joseph College and Southern Connecticut State College. She is a special education teacher. Presently her husband is assigned at the U.S. Coast Guard Research and Development Center, Groton, Conn. . . .

2/Lt. DAVID J. MANCHESTER to Miss Mary M. Beaudry on February 2, 1974 in Newport, Rhode Island. Mrs. Manchester graduated from Beaver College, Glenside, Pa., and is an administrative assistant at the Naval War College. The bridegroom recently graduated from Officer Training School, Lackland AFB, Texas. . . . ROBERT W. SMITH and Miss Joan M. Bucci on May 18, 1974 in Canton, Massachusetts. Mrs. Smith graduated from Bridgewater State College. Her husband is a metallurgist at Yankee Atomic Electric Co., Westboro, Mass.

RICHARD ALPERT is a technical writer at Unitrode Corp., Watertown, Mass. . . . WILLIAM A. BENSCH works as a senior programmer at General Electric's space division in King of Prussia, Pa. . . . HARVEY S. BIERENBAUM serves as a research engineer at Celanese Research Co., Summit, N.J.

JOHN F. DODA works at Underwriters Labs, Inc., Melville, N.Y. . . . CHARLES T. DOE, who recently became an associate of the Society of Actuaries, has been promoted to actuarial associate at State Mutual Life Assurance Company of America in Worcester. . . . STEPHEN A. ERIKSON is employed by Anderson Bros., Pharmacy, Worcester. . . . JOSEPH E. FITZGERALD, JR. is a design engineer at Babcock & Wilcox, Lynchburg, Va. . . . WARREN F. FOLLETT is with Hughes Aircraft Co., Culver City, Calif. . . . New England Telephone & Telegraph Co., Framingham, Mass., employs CHARLES E. FORAND. . . . JOHN GRANT is with the sales office of Cambion (Cambridge Thermionic Corp.) in Cambridge, Mass. He had been with Digital Equipment Corp., Maynard.

EDWARD L. GRIFFITH, JR. is now with Emcon Associates in California. He works in the field of waste management. . . . RICHARD M. GROSS received his PhD from the University of Utah in June. This fall he will serve as a research engineer at Dow Chemical Co., Midland, Mich. . . . STEPHEN W. HAMMOND works for the Morris County Dept. of Public Works, Morristown, N.J. . . . PAUL HAYNER holds the post of estimating engineer at Spaulding & Slye Corp., Boston. . . . GREGORY T. HOPKINS is with Mitre Corp., Bedford, Mass. . . . RONALD L. JONES was recently appointed sales engineer for Jones' Enterprises, Inc., in East Hartford, Conn. Previously he was with Kelly-Springfield Division of Goodyear Tire & Rubber Co. . . . JAMES P. MILLS works as a nuclear project engineer for General Dynamics, Electric Boat Division, Groton, Conn.

STEPHEN F. NAGY serves as a systems sales application engineer at the Foxboro (Mass.) Co. . . . MATTHEW T. NECLERIO is plant engineer and general manager of Paramount Wire and Harness Co., New Haven, Conn. He is also working for his MBA at the University of New Haven. He has had several articles published in various medical journals. . . . JOEL F. O'ROURKE teaches at Holy Name High School, Worcester. . . . STEPHEN O. ROGERS holds the position of plant production supervisor at DuPont in Denton, N.C. . . . Presently THOMAS SEMPREBON is vice president of his family's business, Calmont Beverage, in Barre, Vt. Formerly he was with Goodyear. . . . ROBERT S. TEMPLIN is an attorney-at-law in Haddonfield, N.J. . . . PETER R. WALSH serves as a field engineer for General Electric in Millburn, N.J.

1970

Married: Lt. DANIEL B. BENTLEY (U.S.A.) and Miss Dianne M. Budney on March 30, 1974 in Auburn, Massachusetts. The bride attended Holy Family College in Philadelphia, Pa. and received a BA degree in mathematics from Worcester State College in January. Lt. Bentley recently returned from a tour of duty in Turkey.

ROBERT B. CALLAN is with Wang Laboratories, Inc., Worcester. . . . DONALD A. COLANGELO holds the post of transportation planner, at Harland Bartholomew & Assoc., Memphis, Tenn. . . . CHRISTOPHER J. COWLES is senior systems analyst at Programming Methods, Inc., GTE, New York City. . . . VICTOR J. DENNIS works as a forms analyst for Hartford Insurance Group, Harford, Conn. . . . WILLIAM A. FERRANTI, who is with Factory Insurance Assoc., is located in Waitsfield, Vt. . . . DOMENIC F. FORCELLA, JR. has been nominated for the 1974 Jaycee Distinguished Service Award in Plainville, Conn. He is recognized for his concern for the environment, participation in governmental affairs, and his political involvement.

HOWARD V. GOLDBERG is employed at Kennecott Copper, Lexington, Mass.... ROBERT W. GRADY is a field engineer for General Electric Technical Services Co., Schenectady, N.Y. Currently he works as an overseas technical advisor on G.E. gas turbines. . . . ERIC W. HENRY is studying at College of the Atlantic in Maine.... SHELDON KATZ serves as a computer programmer at Hoffman LaRoche, Cranbury, N.J.... PAUL A. LEE holds the post of principal engineer at Lockheed Electronics, Plainfield, N.J. . . . RICHARD T. LLOYD is with G. T. Schjeldahl Co., East Providence, R.I.

FRANK D. MEOLI works as a sales engineer at Eastern Fire Door Co., Inc., West Haven, Conn. . . . GREGORY O. MOBERG is a research engineer at Eastman Kodak Company, Rochester, N.Y. . . . GEORGE P. MOORE, who received his JD from Suffolk University, is a self-employed attorney in Worcester. . . .KENNETH W. OBERG now works for Narragansett Electric, Providence, R.I. He is also a WPI evening graduate student.

GERALD E. PIEPIORA is a sales engineer for Freemire & Assoc., Inc., Baltimore, Md.... RICHARD B. ROCK, who has received his professional engineer's license in Pennsylvania, works at United Engineers and Constructors, Inc., Philadelphia. He is in the nuclear power plant field. . . . ROBERT A. ROSENBERG serves as manager, special services, at Tahoe Donner, a 4,000-acre resort community in the California Sierras at Truckee. His responsibilities include community relations, working as local marketing coordinator, special projects manager and being responsible for setting up the Property Service Company for the parent company, Dart Resorts. . . . STEPHEN A. TUREK is a graduate student at the University of Connecticut, Storrs. . . . PHILIP C. WARREN is a staff engineer in the plant engineering department at Nashua (N.H.) Corp.... JUAN F. WEISZ is currently a graduate teaching assistant at Northeastern University, Boston. . . . PAUL C. WILSON, a PhD candidate at the University of Connecticut, has been awarded the $750 Michael Perry Memorial Scholarship of the Hartford Section of the American Welding Society. His research focuses on welding and casting of metals and he will use the award to support a portion of his studies of weld metal solidification in electroslag welding.

1971

Married: CHARLES E. BROADHURST and Miss Shireen Rahavy on February 1, 1974 in Blackstone, Massachusetts. Mrs. Broadhurst graduated from Endicott Junior College in Beverly and is employed by the Blackstone Valley National Bank. She is also "Wendy the Weathergirl" on radio station WMRC, Milford. The groom is assistant branch manager of the Blackstone Valley National Bank in Millbury. . . . JAMES W. REGAN to Miss Joan H. Huesner on February 16, 1974 in Worcester. The bride is a registered nurse at Memorial Hospital. Her husband is a civil engineer for Zoppo Construction Co., Norwood, Mass.... ROBERT A. WOOLLACOTT, JR. to Miss Nancy J. Marchak on May 11, 1974 in West Hartford, Connecticut. Mrs. Woollacott, a Becker graduate, is a secretary with Henry Schadler Associates, Architects, West Hartford. The groom, who is with Curtis 1000 in West Hartford, is an MBA candidate at the University of Connecticut.

HAROLD B. ALTER is a graduate student in the City and Regional Planning Department at the University of North Carolina, Chapel Hill. This year he receives his MRP. . . . RICHARD A. ARENA serves as a foreman at U.S. Steel Supply, Brighton, Mass. . . . DON A. BACKLUND is an insurance and real estate broker with R. E. Backlund Insurance Agency, Inc., Rehoboth, Mass.... WILLIAM R. BELOFF is employed at Soil & Rock Instrumentation, Newtonville, Mass. . . . AVANISH I. BHAGAT is an MBA student at the University of Bridgeport in Connecticut. . . . CHARLES C. BLAKE is with GM Detroit Diesel, Detroit, Mich. . . . BRUCE N. BOSSERMAN is a graduate student at the University of Connecticut in Storrs.

ROBERT M. BYRNE works as an assistant engineer at Hartford Electric Light Co., Wethersfield, Conn. . . . THOMAS R. COPP, product engineer in Simonds' research and development department, Fitchburg, Mass., was profiled in the May 3rd issue of *Simonds Spotlighter*. Tom, who has been with the company since 1972, analyzes the problems occurring in marketed products which are not performing properly. He then develops a program to improve product performance. Currently, with the aid of a new dynamic testing machine, he is working to improve the fatigue resistance of the backing material used for a carbide tipped bandsaw.... JAMES F. CRITTENDEN is an engineering trainee at Packer Machine Company, Meriden, Conn. . . . WILLIAM S. DELIS works at Combustion Engineering, Windsor, Conn.... ROBERT C. DUGGER, JR. serves as an accountant trainee at Acnat Corporation, East Hartford, Conn. . . . RICHARD E. DYNIA works for Monsanto Co. in Bloomfield, Conn.... JAMES R. FAY is a structural engineer for the U.S. Army Corps of Engineers, Waltham, Mass.... MICHAEL J. GITLEN holds the post of operations auditor at E-B Industries, Inc., Simsbury, Conn.... NORMAN E. JOHNSON is a process development engineer for General Electric, Mt. Vernon, Indiana.

MICHAEL J. KAJEN is a graduate student at WPI. . . . JOHN J. LARAMEE works at New England Telephone in Framingham, Mass.... Dr. RICHARD P. LINDSAY, a senior research engineer at Heald Division, Cincinnati Milacron, Worcester, was a featured speaker at the 13th Abrasives Conference held in Philadelphia in June. His topics were: "Chatter-Free Grinding Time," "Evaluating Grinding Fluid Performance," and "Factors Affecting Borazon CBN Grinding Systems." He has worked extensively in the research and development of grinding systems and machine hardware. He is widely published in technical books, professional journals, and trade magazines. . . . SCOTT T. McCANDLESS works for Environmental Research & Technology, Lexington, Mass.... W. ROBERT MELVILLE is a facilities engineer at Rochester Products/General Motors in Rochester, N.Y. He is also studying for his MBA at Rochester Institute of Technology.

DAVID P. MURPHY works for the Fairfax (Va.) county government. . . . THOMAS A. PANDOLFI is on the professional technical staff at Princeton University. . . . DONALD K. PETERSON has been promoted to investment analyst at the State Mutual Life Assurance Co. of America in Worcester. He joined State Mutual in 1973 after graduating from Dartmouth's Amos Tuck School of Business Administration. . . . Currently JOHN G. PLONSKY is a graduate student at the University of Massachusetts. . . . ABBAS A. SALIM works for Martin Marietta Corp., Denver, Colo. . . . LAWRENCE SNIEGOSKI is completing requirements for his master's degree at Fairleigh Dickinson College, Rutherford, N.J.... DENNIS J. STABA is with Combustion Engineering, Windsor, Conn. . . . DONALD TANANA, now a warehouse supervisor for Clairol, Inc., in Glendale, Calif., is attending USC in the MBA evening program. . . . RICHARD V. TINO, JR., who is a quality improvement engineer at Polaroid Corp., Waltham, Mass., was married July 8, 1973 to Miss Clare E Snow of Easton, Mass. . . . URMAS A. VOLKE is a design engineer with Dynamac Inc. (consulting engineers) in Natick, Mass.... STEVEN C. WATSON is the outside plant manager at New England Telephone Co., Fitchburg, Mass. . . . TRENT GERMANO works for Parsons, Brinckerhoff, Tudor and Bechtel in Atlanta, Ga. The Germanos have a daughter Kristen, who is a year old.

1972

Married: GLENN E. CABANA and Miss Denise T. Robichaud April 21, 1974 in Methuen, Massachusetts. Mrs. Cabana is a secretary. The bridegroom is with Western Electric in North Andover. . . . Lt. JOHN A. WOODWARD to Miss Nancy D. Roden on March 9, 1974 in Pensacola, Florida. The bride is a senior at Montevallo University in Alabama. Her husband is serving with the U.S. Marine Corps at Cherry Point, N.C.

jamesbury

manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves

Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

RALPH A. BLACKMER is with Astra Pharmaceutical Products, Inc., Worcester. . . . CHARLES R. CAIN, JR. is a graduate student in the electrical engineering department at WPI. . . . SAMUEL T. DAVIS is foreman-MMP Program at General Electric in Danville, Illinois. . . . JOSEPH V. GOTTA serves as a production controller at Ludlow Corporation, Holyoke, Mass. . . . ROBERT A. GRANT is an assistant engineer at Howard, Needles, Tammen & Bergendoff, Boston. . . . Currently CHRISTOPHER L. HATCH is an associate engineer at New England Telephone Co., Framingham, Mass.

JOHN M. CUTH works as an associate engineer at Raytheon Co., Portsmouth, R.I. . . . GARY A. FOOTE is an analyst/programmer at Aetna Life & Casualty, Hartford, Conn. . . . JEFFREY S. HUNTER works for Riley Stoker Corp., Worcester. . . . ROY A. LINDBLAD holds the post of equipment engineer at Lane Construction Corp., Meriden, Conn. . . . DOUGLAS MACH is with General Instruments Corp., Chicopee, Mass. . . .

LARRY J. PRICKETT is a process engineer at du Pont-Spruance, Fibers Division, Richmond, Va. . . . KENNETH S. PRIGGEN works at United States Gypsum Co., Stony Point, N.Y. . . . MARCELLO A. RANALLI is with NAB Coronado, Coronado, Calif. . . . KEITH F. SIMONS serves as a design engineer at Morgan Construction Co., Worcester. . . . 2/Lt. BRUCE M. SZYPOT, a member of the millimeter wave radar team from the Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., is also a coach. He coaches the first-place Colts team in the 9-13 year old division of the Junior Basketball League. Bruce joined the Recreation Services Youth Activities basketball program last season and coached the Colts to a second-place spot in the League. While at WPI, he served as coach to a team of 13 and 14-year-olds. . . .RICHARD S. TUMOLO presented a paper, "An Experimental Determination of Listeners' Ability to Detect and Decode Simultaneous Messages on the Basis of Pitch," before the psychological acoustics section of the Acoustical Society of America in New York last April. Presently a graduate research assistant at the University of Massachusetts, his work is supported by the National Institutes of Health. This summer he receives his MS in electrical engineering. . . . Terry Steam Turbine Co., Hartford, Conn. employs ROBERT F. WEIR. . . . RICHARD E. WILLEY holds the post of publication specialist at Norton Company in Worcester.

1973

Married: Miss KATHLEEN A. COYLE to Mr. Gordon S. Nichols on January 5, 1974. The bride is employed as an analytical engineer at Hamilton Standard, Windsor Locks, Conn., where her husband serves as a cost engineer. . . . GEORGE P. GOSSELIN and Miss Glenna Marshall in Falls Village, Connecticut on April 20, 1974. Mrs. Gosselin attended Anna Maria College and graduated from the Yale-New Haven Nursing Program. Mr. Gosselin is employed by Travelers. . . . PETER B. WEBER and Miss Ann Marie Schonning on January 12, 1974 in Worcester. The bride is a senior at Worcester State College. The groom is asssociated with his father at Allied Metal Products Co.

ERIC BERGSTEDT is a product engineer at Norton Co., Worcester. . . . JEFF E. BLAISDELL has been appointed building inspector in Upton, Mass. He is a project engineer with the George B. H. Macomber Co. . . . STEVEN M. BUBA has been employed as director of computer operations at United Restaurant Equipment Co., North Smithfield, R.I. . . . JOYCE L. CAPLOVICH, who has been with WICN (radio) in Worcester, plans to join VISTA shortly. . . . HAN-TEE (HSI) CHEN is a research assistant at Rutgers Medical School, Piscataway, N.J. . . . RICHARD D. CRISPINO serves as a project engineer at Combustion Engineering, Inc., Windsor, Conn. . . . Currently THOMAS P. DAGOSTINO is a design engineer with Tektronix, Inc., Beaverton, Oregon.

THOMAS J. DUTKIEWICZ works for Northeast Utilities, West Springfield, Mass. . . . WILLIAM S. ELLIOTT is presently working for General Electric at South African General Electric, New Castle, South Africa. Previously he had spent five months in France at one of the world's largest steel mill complexes near Marseille. . . . RICHARD T. GARAGLIANO is a development engineer at Hercules, Hopewell, Va. . . . 2/Lt. ADRIEN L. GAUDREAU, JR. (USAF) is now stationed at L. G. Hanscom Field, Bedford, Mass. . . . JOHN F. GIBSON has been teaching religion, mathematics, and science to elementary and high school students at Above Rocks, St. Catherine, Jamaica. He is a novice for the Society of Jesus, New England Province, and is studying at Weston College of Theology, Cambridge, Mass. . . . STEPHEN GREENBERG is at The U.S. Navy Nuclear Power School, Mare Island, Calif. . . . JOSEPH J. MAGRI works as a loss prevention representative for Liberty Mutual Insurance Co., Boston.

MICHAEL E. MERKLE has been employed as a design engineer at Taylor, Wiseman & Taylor, Moorestown, N.J. . . . AMERICO V. PASQUAZZI is a research assistant in the EE department at the University of Rhode Island in Kingston. . . . BILL C. PENNEY is a cardiovascular technician at St. Vincent Hospital, Department of Cardiology, Worcester.

BERTRAND PINEL-DARRIEUX is with Siibela in Paris, France. . . . NANDUBHAI M. PRAJAPATI serves as a mechanical designer at Mikropul Canada, Ltd., Bramalea, Ontario, Canada. . . . DANIEL H. PRIOR is now with Massachusetts Electric Co., Hopedale, Mass. . . . STEPHEN R. SLAVICK is a junior engineer in the main office of the New York State Department of Transportaion, planning and research bureau. . . . 2/Lt. RICHARD F. SLIWOSKI is with the 8th (Army) Infantry Division in Dexheim, Germany, where he is a platoon leader in Company B of the 12th Engineer Battalion.

GREGORY L. STAMPER is now an ensign in the USNR where he serves as a student naval aviator. He is located in Kingsville, Texas. . . . MANUBHAI G. THAKKAR serves as a quality assurance supervisor at Royal Industries, Mississauga, Ontario, Canada. . . . ANTHONY R. URJIL is a sales trainee at Morse Chain, Ithaca, N.Y. . . . JOSEPH J. VALLERA is an engineer-advance products/generator advance engineering, for General Electric Co. in Lynn, Mass. . . . ROBERT R. WOOD works as an application engineer at Ingersoll-Rand, Wellesley, Mass. . . . GEORGE E. YESOWITCH teaches science for the North Smithfield (R.I.) School Department.

It was here three years ago

and two years ago we found it coming back

and just last year it showed up again.

Homecoming.

Look for it at WPI October 11 and 12!

The WPI Alumni Association announces

RIO DE JANEIRO

A brochure on this program was mailed to all alumni in May. Additional brochures and reservation forms may be obtained upon request from the Alumni Office.

$349

plus 10% tax and service

Departing from Boston on Tuesday evening, November 5. Returning to Boston on Wednesday, November 13.

Completed Careers

PHILIP L. SIBLEY, '04, of Pasadena, California died recently. Born on May 27, 1883 in Westfield, Mass., he later graduated as a mechanical engineer from WPI. During his lifetime he was associated with E. P. Noyes, Standard Plunger Elevator Co., Otis Elevator Co., Sinclair Motor Co., and Henry Hunting Book Store. From 1926 until 1939 he was with G. Lawrence Stimson Co. in Pasedena.

ROY A. FITCH, '05, died on February 28, 1974 in Potsdam, New York. Born on July 12, 1881 in Hopkinton Mass., he later became a student at WPI. In 1905 he graduated as a civil engineer. His entire professional career was devoted to structural engineering.

In 1905 he was employed at the Pennsylvania Steel Co. at Harrisburg, Pa. He also held positions with Virginia Bridge and Iron Company, Roanoke, Va. and the Department of Structures of the New York Central Railroad where he was employed from 1909 until his retirement in 1949.

ALBERT G. BELDEN, '07, the retired manager of Research and Engineering of the Grinding Machine Division of Norton Company, died in Worcester on March 30, 1974.

He was born on June 5, 1885 in Lenox, Mass. In 1907 he received his mechanical engineering degree from WPI. During his career he was with O.K. Tool Holder Co.; Pneumatic Scale Corp.; Mfg. Equipment & Eng. Co.; Heald Machine Co.; and United Shoe Machinery Corp. He retired from Norton in 1950 after 38 years of service. While at Norton, he was responsible for over 30 grinding machine patents.

Mr. Belden belonged to the American Society of Tool & Manufacturing Engineers. He was a registered professional engineer in Massachusetts.

ROBERT C. BLISS, '07, of Bedford, New York died on February 17, 1973. He was 88.

A Worcester native, he was born on November 13, 1884. After studying at WPI, he was self-employed for several years and then joined the Travelers Insurance Co. Later he was an industrial engineer at Remington Rand, Inc.

ARTHUR J. KNIGHT, '07, who taught civil engineering at WPI from 1910 until 1957, died in Worcester on June 1, 1974. He was 89 years old.

A Worcester native, he graduated from WPI as a civil engineer in 1907. For three years he was a resident engineer for the Northern Pacific Railroad before returning to WPI as an instructor in 1910. In 1916 he became an assistant professor and superintendent of buildings and grounds. He was made acting head of the civil engineering department in 1956. In 1957 he retired from teaching, but he continued working with the school plant and was named Professor Emeritus, C.E. and Consultant for Building Planning.

Prof. Knight supervised the construction and renovation of a number of campus buildings including Kaven Hall and Olin Hall. He was treasurer of the Athletic Association and a member of the Athletic Council from its founding in 1915 until 1968. He was a member of the Consulting Committee on Development and Building.

In 1960 he was awarded a citation which read in part: "there is some of 'A.J.' in every facility constructed at Worcester Tech over the last 50 years." The students honored him by dedicating the *Peddler* to him in 1956, and in 1963 WPI's athletic field became known officially as the A.J. Knight Athletic Field.

Prof. Knight, who was also active in traffic planning in Worcester, was a member of the Worcester Society of Civil Engineers, the Boston Society of Civil Engineers, MSPE, ASEE and AAUP. He was a past vice president of the Northeastern Section of ASCE and belonged to Sigma Phi Epsilon, Sigma Xi, and Skull.

HERBERT P. SAWTELL, '08, died in Worcester on March 1, 1974. He was 89.

Mr. Sawtell was a sales engineer at the former Leland-Gifford Co., where he worked for 47 years before retiring in 1959.

He was born in Clinton, Mass. on December 23, 1884. After graduating as a mechanical engineer from WPI in 1908, he worked at Bath Grinder Co. and Sullivan Machinery Co. before joining Leland-Gifford in 1912.

He was a member of the Tech Old-Timers Club, and a charter member and past master of Rose of Sharon Lodge of Masons. He was a 32nd degree Mason, a member of all Scottish Rite Bodies, and the Massachusetts Conistory in Boston.

Mr. Sawtell was the father of Edward A. Sawtell, '36.

CHARLES G. LIDSTROM, '09, died April 18, 1974 in Mt. Vernon, New York. He was 92 years old.

In 1949 he retired as a civil engineer from the New York City Board of Transportation. Previously he had been associated with Rodman, New York City; the Catskill Aqueduct Board of Water Supply, City of New York; and the Sewer Construction Department in Brooklyn.

He was born in Worcester on Nov. 26, 1881 and graduated from WPI in 1909. A professional engineer and land surveyor in New York state, he was also a member of the New York City Municipal Engineers.

FRED L. HEWES OF Old Bridge, New Jersey, class president of the Class of 1910, died on March 12, 1974.

He was born on December 9, 1889 in Westfield, Mass. After graduating from WPI as a civil engineer, he worked for Fred W. Marks in Worcester and for the Harris Co. in New York City. Later he was with Turner Construction Co., Donald Hewes, and M. Shapiro & Sons. He also ran Fred L. Hewes Construction Co. in New York City, retiring in 1958.

Mr. Hewes was a member of Tau Beta Pi and Sigma Xi.

RAYMOND E. KELLEY, '10, of Harwich, Massachusetts passed away on January 31, 1974 at the age of 85 following a long illness.

A native of Greenwich, Mass., he graduated as a civil engineer from WPI in 1910. After graduation he spent two years in Santo Domingo and Puerto Rico on railroad surveys and narrow gauge work for transportation of sugar cane from plantations to the sugar mill. Upon his return to the states, he spent 30 years in Hartford, Conn., first with Architects & Engineers and large construction companies.

Later he founded his own building and contracting firm which he headed for 22 years. After his retirement, he bought four old houses in succession which he restored while living in them.

Mr. Kelley was a member of Theta Chi fraternity.

PHILIP C. FOSTER, '14, editor of *Foster's Daily Democrat,* Dover, New Hampshire, died in Dover on February 10, 1974. He was 81.

He was born in Dover on February 19, 1892 and later studied at WPI. From 1911 to 1913 and from 1935 until his death, he had served as editor of the *Democrat*. He also had been in the newspaper business in Sheraton, Wyoming and Old Orchard Beach, Maine, and in the printing business in Portland. For several years he published directories in Portland and Springfield, Mass. During World War II, he was with Sylvania Electric Co. in Dover.

Mr. Foster was a trustee of the Woodman Institute in Dover and during the last ten years spent much time rearranging and recataloguing the Institute's displays and records. He was a director of the United Appeals Drive and a member of the Southeastern New Hampshire Mineral Club, the Smithsonian Associates, the Maine Mineralogical Society, and a past president of Typothetae. He was a life member and former president of the Lifelong Colonists.

CLINTON C. HUBBELL, '14, of Norwalk, Connecticut passed away last winter at the age of 84.

He was born on November 8, 1889 in Wilton, Conn. For many years he served as a civil engineer and surveyor in Norwalk. In the 1920's he developed the Hubbell Marine Cooler which enabled Ford auto engines to be used in boats.

During his career he was associated with the Connecticut Co., New Haven; Goodhue & Hubbell, Norwalk; and Nash Engineering Co. He also served as assistant city engineer in Norwalk and with the U.S. Army in France during World War I. He belonged to the Fairfield County Engineers Association.

EDWARD T. JONES, '14, died in Salem, Oregon on January 27, 1974. He was 84 years old.

Born on August 1, 1890 in North Adams, Mass., he later graduated from WPI as a civil engineer. From 1914 to 1916 he worked for the Public Service Commission in New York. After a stint with the New York State Highway Dept., he spent two years as a lieutenant in the Corps of Engineers and saw duty with the A.E.F. in France during World War I.

From 1919 to 1937, he was plant engineer and then manager and vice president of Stevens & Thompson Paper Mill in Greenwich, N.Y. He was next associated with the Brown Co., Berlin, N.H., and from 1945-57 was project engineer with Chas. T. Main, Inc., Boston, where he specialized in paper mill design, including plants in Mexico and Brazil. Following his retirement in 1958, he devoted himself to genealogical research, producing 21 volumes and monographs.

Mr. Jones belonged to Sigma Phi Epsilon fraternity, the Technical Association of the Pulp & Paper Industry, and ASCE.

WALTER E. SPICER, '14, of North Palm Beach, Florida, passed away on March 7, 1974. He was 83.

He was born in Boston on March 9, 1890. He graduated from WPI as an electrical engineer in 1914. Following graduation he joined Worcester Consolidated Street Railroad Co. Later he was with United Electric Light Co., Springfield, Mass.; New England Power Co., Worcester; U.S. Ordnance Dept., Springfield; Turner Falls Power Co., Westfield; Ludlow (Mass.) Mfg. Associates; and the Clark Thread Co. and the Heller & Mertz Co., in Newark, N.J. In 1959 he was retired from the American Rayon Corp., Elizabethton, Tenn., after 30 years of service.

Mr. Spicer was a member of Phi Sigma Kappa fraternity.

DWIGHT E. ALLEN, '15, passed away on April 3, 1974 in Bradenton, Florida. He was 82.

He was born in Northboro, Mass. on April 11, 1891 and graduated as a chemist from WPI in 1915. From 1918 to 1957 he was employed as a chemical engineer by the Carborundum Co., Niagara Falls, N.Y.

In 1963 he moved to Florida where for the last seven years he and Mrs. Allen have been residents of Bradenton Manor, a Presbyterian retirement home.

ALBERT H. DERVIN, '15, of North Canton, Ohio, died on April 3, 1974

He was born on October 28, 1893 in Clinton, Mass. After studying civil engineering at WPI, he became an assistant sales manager at Worcester Pressed Steel. Later he was general sales manager at Canton (Ohio) Forge & Axle Co. and district manager for Endicott Forging & Mfg. Co., Endicott, N.Y. He also served as a district manager for Worcester Pressed Steel Co. and Dollin Corp., Irvington, N.J.

Mr. Dervin belonged to the Pressed Metal Institute, Drop Forging Institute, and American Die Casting Institute.

CARL F. PALMER, '15, died January 13, 1974 in Lowell, Massachusetts.

He was born in New Bedford, Mass., June 14, 1892 and received his BS in electrical engineering from WPI. He was a member of old Delta Tau fraternitiy and Tau Beta Pi honorary. In 1915 he joined the electrical power test section of General Electric, Schenectady. For many years he was engaged with the Locks and Canal System of Lowell, Mass. as chief engineer, and with John A. Stevens Consulting Engineering of Lowell, Mass., in charge of electrical design.

In later years, he was associated with Central Maine Power and Chas. T. Main of Boston specializing in power plant design, his last work involving the Niagara Power Plant. He was a registered professional engineer in Maine, New Hampshire, Massachusetts, Rhode Island, and New York. In 1961 he retired to his farm in East Pittston, Maine, where he was active in Maine Historical Society work.

PHILIP N. COOKE, '16, retired vice president of Norton Behr-Manning Overseas, Inc., died February 16, 1974 in Clearwater, Florida. He was 79.

A native of Worcester, he graduated as a mechanical engineer from WPI. In 1916 he joined Norton as a sales engineer. From 1920 until 1946 he served as a sales manager and managing director of Norton Co. of Canada, Limited. In 1946 he returned to Worcester as manager of the foreign division and in 1951 he was elected vice president in charge of abrasives products for Norton Behr-Manning Overseas, Inc. He retired in 1953 after 37 years with the company.

After his retirement he moved to Florida where he helped to form the firm of J. W. Hornbrook, Inc., which built luxury homes in the Clearwater area.

Mr. Cooke, a past president of the Hamilton, Ontario (Canada) Chamber of Commerce, was the father of Kenneth G. Cooke, '48.

HAROLD C. LEONARD, '16, of Baton Rouge, Louisiana, died in May of 1973.

He was born in Worcester on October 14, 1894 and graduated as an electrical engineer from WPI in 1916. In 1919 he received his MSEE from Union College. A naval veteran of World War I, he also was associated with General Electric Company and the Submarine Boat Corporation.

During his lifetime he was with Stone & Webster in Boston and Virginia; served as general superintendent of the El Paso Electric Company; and worked for the Gulf States Utilities Company where he retired as executive vice president and director in 1959. Later he founded the Leonard Agency (Insurance) in Baton Rouge.

Active in civic and business activities, he was president of the United Givers Fund and of the local chapter of the Society of the Advancement of Management. He helped found the Baton Rouge Port Development Association, served as president of the Southeastern Electric Exchange, and received the Andrew M. Lockett Civic Leadership Medal from the Louisiana Engineering Society.

RAYMOND W. T. RICKER, '16, of Philadelphia, Pennsylvania died on April 5, 1974.

He was born on September 21, 1895 in New Durham, N.H. After graduating from WPI as a chemist, he joined du Pont de Nemours & Co., Wilmington, Del. During World War I he served as a lieutenant aviator with the Signal Reserve Corps in France.

Later he was with McGraw Hill Co., New York City; Hames Electric Protection Co., New York; and Brown Instrument Company, Philadelphia. He was advertising manager of the Autogiro Co. of America, account executive for Watson & Co., and a member of the advertising department at Minneapolis-Honeywell Co., Philadelphia upon his retirement in 1960.

Mr. Ricker belonged to the National Industrial Advertisers Association, Lambda Chi Alpha, and Skull.

DONALD T. CANFIELD, '19, of West Lafayette, Indiana, professor emeritus of electrical engineering at Purdue University, died on February 22, 1974.

Prof. Canfield was born in Brooklyn, N.Y. on Sept. 25, 1895. He graduated as an electrical engineer from WPI, where he belonged to Phi Gamma Delta fraternity. During World War I he was a second lieutenant in the Air Corps. Later he was with Jencks Knitting Machine Co. From 1921 until 1964 he served on the electrical engineering staff at Purdue University. He also worked as a consultant for Duncan Electric Co. for many years.

He belonged to Sigma Xi, Tau Beta Pi, Skull, Eta Kappa Nu, and Scabbard and Blade. A registered professional engineer in Indiana, he also was a member of ASEE, AIEE and NSPE.

EDGAR R. JONES, '19, of Framingham Center, Massachusetts, died on March 21, 1973.

He was born on March 14, 1894 in North Smithfield, R.I. After graduating from WPI as a mechanical engineer, he joined Mohawk Carpet Mills, Amsterdam, N.Y. He was with the Roxbury Carpet Co., Saxonville, Mass. from 1927 until 1942 and from 1947 until 1960 when he retired as chief plant engineer. From 1942 until 1947 he was employed by Jones & Lamson, Springfield, Vt.

During World War II, while with Jones & Lamson, he was associated with the Office of Scientific Research and Development-National Defense Research Committee, Washington, D.C. He worked on a secret project (which was also being undertaken by Canada and England) to help develop a projectile that would pierce a 9½ inch steel plate at a 45° angle and be capable of blowing up a German tank. He designed and set up a range that was reportedly one of the best in the country. The project was a success and he was awarded a certificate in appreciation of exceptional service.

After retiring in 1960, Mr. Jones, who was a registered professional engineer, became a self-employed consultant. He was a member of Phi Sigma Kappa.

HOSMER R. KIMBALL, '19, of East Boothbay, Maine, died on February 8, 1974.

He was born on Sept. 19, 1898 in Jersey City, N.J. In 1919 he graduated with a BSEE from WPI. During his career he was with General Electric, Fort Wayne, Ind.; Forbes & Meyers in Worcester; B. F. Sturtevant Company, Hyde Park; Sundh Electric Co., and the Clark Controller Company of Cleveland, where he served as New England manager and district manager for many years. In 1955 he became a self-employed manufacturers' agent with his own firm, Hosmer R. Kimball, Inc

PAUL M. ABBOTT, '20, died on January 4, 1974 in Boca Raton, Florida.

He was born on August 16, 1897 in Terre Haute, Ind. After graduating from WPI, he worked for a while as a general electrician. He then became advertising manager for Motion Picture News. For two years he was with McGraw Hill Publishing Co. in the New England area. In 1932 he became a partner in Sutherland-Abbott Advertising Agency, Boston, Mass.

Mr. Abbott was a member of Theta Chi fraternity.

AUGUSTUS L. DUTTON, '21, died on February 28, 1974 in Winchester, Massachusetts. He was 76 years old.

He was born on September 22, 1897 in Lowell, Mass. After studying electrical engineering at WPI, he went on to Lowell Institute and MIT. Later he was with Lowell Electric Light Co. and Walter B. Foster Co., Hingham, Mass. For 38 years he was employed as a professional engineer at Boston Edison. He retired in 1962.

Active in Masonic circles, Mr. Dutton was also a former director of the Reading (Mass.) Red Cross and past president of the Wakefield Retired Men's Club. He was a life member of the National Heating Association.

LESTER S. EASTMAN, '22, died at his home in Lancaster, Pennsylvania on April 23, 1974. He was 74 years old.

In 1964 he retired as sales representative for Norton Co. (Worcester) in its Eastern Pennsylvania Division.

Born in Worcester on August 1, 1899, he graduated as a civil engineer from WPI in 1922. After graduation he was a construction engineer for the City of Worcester for three years. From 1925 until 1964 he was associated with Norton Co.

Mr. Eastman belonged to the Worcester Society of Civil Engineers and ASTME.

CARLETON S. PERKINS, '22, passed away on February 19, 1974 in Hyannis, Massachusetts. He was 73 years old.

A native of Boston, he later became a student at WPI. During his career, he was with Electrical Research Products (a subsidiary of Western Electric Co.); and Altec's electronics Division, which during World War II assembled, tested, and installed highly complex gunnery training devices. In 1962 he retired as vice president and general manager of Altec's electronics Division.

Mr. Perkins was a former town official in Plymouth, Mass., where he served as a member of the Finance Committee, chairman of the Water Commission, and a member of the Sewage Treatment Construction Committee. Later he was a member of the Yarmouthport Finance Committee and the chairman of the Capital Outlay Committee, which he organized.

HALSEY A. GALLUP, '23, of Norwich, Connecticut died March 25, 1974 at the age of 73.

A retired teller of the Hartford National Bank & Trust Co., Norwich, he was also a former trustee and Treasurer of the Otis Library and treasurer of the Gallup Family Association.

A Norwich native, he was later a student at WPI. During World War II he served in the U.S. Air Force.

RANDOLPH A. HOLTON, '25, of Worcester passed away suddenly on January 12, 1974.

He was born in Worcester on May 9, 1902, later becoming a student at WPI. For many years he was owner and manager of R. A. Holton Co., Worcester. He had also worked for the New York, New Haven & Hartford Railroad.

RUSSELL F. BARKER, '26, passed away on December 18, 1973 in Atlantic City, New Jersey at the age of 69.

He was born in Leominster, Mass. On July 10, 1904 and graduated as a mechanical engineer from WPI. During his career he was with Sullivan Machinery Co., Armstrong Cork Co., Atlantic Sewerage Co., Philadelphia Storage Battery Co., Day & Zimmerman (consulting engineers), Campbell Soup Co., Wright Aeronautical Corp., and E. R. Squibb & Sons. For 17 years he was associated with the Continental Can Co. of Wilmington, Del. and he later joined the Public Housing Authorities of Pleasantville and Atlantic City.

Mr. Barker, a member of Sigma Alpha Epsilon, belonged to the Delaware Society of Professional Engineers, and was a past president and charter member of the Delaware Chapter of the American Institute of Plant Engineers. He also belonged to the South Jersey Chapter of AIPE, the executive board of the New Jersey Society of the Sons of the American Revolution, the Huguenot Society of New Jersey, the Descendants of the Colonial Governors, and the Atlantic County Historical Society. He was a past secretary of the Philadelphia chapter of the WPI Alumni Association.

WILBERT T. MOORE, '26, founder of Moore Survey & Mapping, Shrewsbury, Massachusetts, died on April 22, 1974 in Worcester. He was 69.

Until his retirement in 1970 he was chairman of the board of directors of the company. A registered professional engineer and land surveyor, he was also a member of the American Congress on Surveying and Mapping and a past president of the Central Massachusetts Region of Massachusetts Association of Land Surveyors and Civil Engineers.

He was born in Huntington, Mass. on September 8, 1904. After studying at WPI, he worked as an engineer with the Massachusetts Department of Public Works for 20 years.

In 1946 he founded W. T. Moore & Son, which later became Moore Mapping & Survey Corp. From 1951 to 1959 he took leaves of absence to direct survey work at U.S. Air Force bases in Greenland and Spain for the consulting firm of Metcalf & Eddy, Boston.

Mr. Moore belonged to the Worcester Society of Civil Engineers.

LESLIE T. MILLER, '29, of Baltimore, Maryland passed away on December 30, 1973.

He was born on August 9, 1908 at Townsend, Mass. In 1929 he received his mechanical engineering degree from WPI. He was employed by the Wright Aeronautical Corp., Paterson, N.J., and the Glenn L. Martin Co. in Baltimore, where he served as a power plant engineer. For a number of years he was an executive assistant at Johns Hopkins University, Baltimore. He belonged to Theta Chi and Sigma Xi.

CLYDE K. CARPENTER, '30, of Beach Haven, New Jersey died last August.

He was born on October 17, 1906 at Norwich, Conn. and later studied civil engineering at WPI. For over 30 years he worked for Western Electric Co., Kearny, N.J., where he served as department chief of industrial engineering. He belonged to Theta Chi fraternity.

WARREN R. PURCELL, '30, a Raytheon official and a former instructor in physics at WPI, died February 3, 1974 in Newton Falls, Massachusetts. He was 64.

Born on July 30, 1909 in Woonsocket, R.I., he later graduated from WPI with a BS in electrical engineering. While studying for his master's degree in physics at WPI, he served as an instructor.

Early in his career he was associated with Westinghouse Corp. and the Aetna and New York Life Insurance companies. Later he was the manager of quality control of the lighting division of the Sylvania Corp. plant in Danvers, Mass.; director of quality control at Brown Co., Berlin, N.H.; and a staff consultant of Rath and Strong, Boston. At the time of his death he was a corporate director of quality assurance at Raytheon Corp., Lexington, Mass. Previously he had been a quality control manager of the Raytheon plant in Lowell.

Mr. Purcell, a member of Sigma Alpha Epsilon, was a fellow of the American Society of Quality Control and had served as director and vice president of the society. He was a founding member and first chairman of the Boston Chapter of the society. The author of many articles on quality control, he also had been on the staff of the department of continuing education at the University of Connecticut for 25 years.

HAROLD T. CUTLER, '31, died suddenly in Washington, D.C. on May 4, 1974. He was 65.

A native of Fitchburg, Mass., he graduated as an electrical engineer from WPI in 1931. From 1933 until 1964 he was employed by the Chesapeake and Potomac Telephone Co. in Bethesda, Md. During his career he served as outside repairman, central office repairman, test man, and service engineer. In 1964 he retired as commercial representative.

Mr. Cutler, who was past president of the Washington, D.C. chapter of the Alumni Association, was a member of Alpha Tau Omega fraternity.

The Reverend **WALKER T. HAWLEY, '31,** died on March 20, 1974 in Brattleboro, Vermont at the age of 65.

Last February he retired as executive secretary of the Boston-based Board of Pastoral Supply of the United Church of Christ, a position which he had held since 1968.

He was born in Gardner, Mass., on June 10, 1908. In 1931 he graduated from WPI as a mechanical engineer and in 1934 he graduated from Andover Newton Theological Seminary. Prior to his latest position, he had served as pastor at Congregational or Federated churches in Dummerston, Greensboro, Manchester, and Middlebury, Vt.

Rev. Hawley was a past trustee of Burr and Burton Seminary, Manchester, Vt.; past director of Otter Valley Special School, Middlebury; and past chairman of the Camp Commission for the Vermont Congregational Conference.

A member of Theta Chi fraternity, he was the brother of C. Freeman Hawley, '23; the uncle of Bradford F. Hawley, '51; and the cousin of Frederick H. Knight, '28.

ALBERT J. MAGEE, '33, passed away on June 26, 1973 in Worcester.

He was born in Worcester on August 8, 1912. After studying at WPI, he received his BSCE from Northeastern University. The major portion of his career he served as a lead field engineer for the foundation consultants, Mueser, Rutledge, Wentworth & Johnston of New York City. Larger projects included: Albany Mall, Denver Mall, a Columbia River bridge (early 60's), and some assignments at Cape Kennedy and Wyman-Gordon (massive press foundations).

Mr. Magee, who was a founder of the Auburn (Mass.) Sportsman's Club and an army veteran of World War II (New Guinea), was the brother of John E. Magee, '33.

P. ERNEST SALMINEN, '35, died in Worcester on February 20, 1974 at the age of 61.

He was born in Worcester and studied at WPI. For 37 years he was a project engineer at Morgan Construction Co.

Mr. Salminen was a former chairman of the Leicester (Mass.) Recreation Committee. He belonged to the Worcester Engineering Society.

ELWYN A. MURDOCK, '36, died of a heart seizure on May 3, 1974 in Hamden Connecticut after he and his wife were held at gunpoint during a robbery at their home-operated antique shop.

Police have been seeking their last evening customer, a well-dressed man in his 30's, who forced the couple into the basement where he tied them up and handcuffed them to chairs. Shortly after being bound, Mr. Murdock suffered the seizure. He died later after his wife freed herself and both were taken to the Yale-New Haven Hospital.

He was born on May 1, 1914 in New Haven, Conn. After studying at WPI, he became associated with the C.W. Murdock Co. as a civil engineer and later became owner of the company. He was also an appraiser and insurance adjustor and had been employed by the Leo Bronson Co.

ROBERT S. DENNING, '37, passed away on March 2, 1974 in Hartford, Connecticut. He was 60 years old.

He was born in Worcester on June 28, 1913. After attending WPI, he became the inventory manager at Webber Lumber & Supply Co., Fitchburg, Mass. During World War II he served as a captain in the U.S. Army. Later he was branch manager of the Manchester (Conn.) warehouse of Gregg & Son, Framingham, Mass. At the time of his death he was assistant manager of Brewster Lumber Co., Hartford.

STANLEY L. HYMAN, '37, of New York City passed away on December 2, 1973. He was 58.

A native of New York City, he graduated from WPI in 1937 as an electrical engineer. During his career, he was associated with Westinghouse Electric & Mfg.; served as a Lt. Commander in the U.S. Navy; and worked as a manufacturers' representative. At the time of his death, he was vice president of Safety First Products Corp., Elmsford, N.Y. He was a member of the National Fire Protection Association.

JOHN M. GRAY, '38, of Sea Cliff, New York, passed away on July 28, 1973.

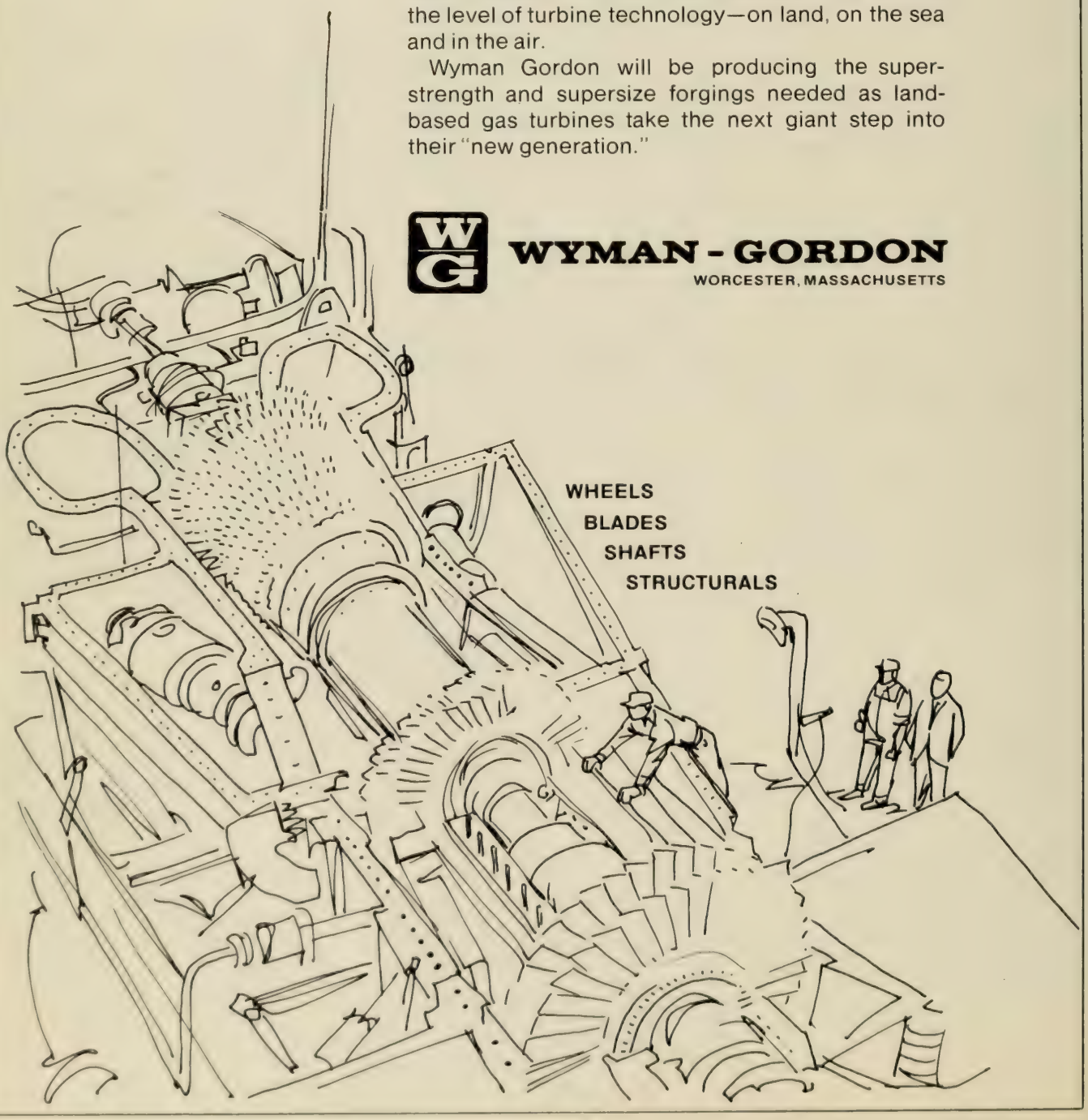
Born on August 10, 1907, he later studied electrical engineering at WPI. He was president of the Aircrib Corp., Sea Cliff, N.Y., a firm which produced the Skinner Baby Box, a partly soundproof plexiglas-enclosed chamber used for isolating babies up to two years of age.

Forging for the new generation of turbine engines

Wyman Gordon's mechanical/metallurgical skills have allowed designers and fabricators to stretch the level of turbine technology—on land, on the sea and in the air.

Wyman Gordon will be producing the super-strength and supersize forgings needed as land-based gas turbines take the next giant step into their "new generation."

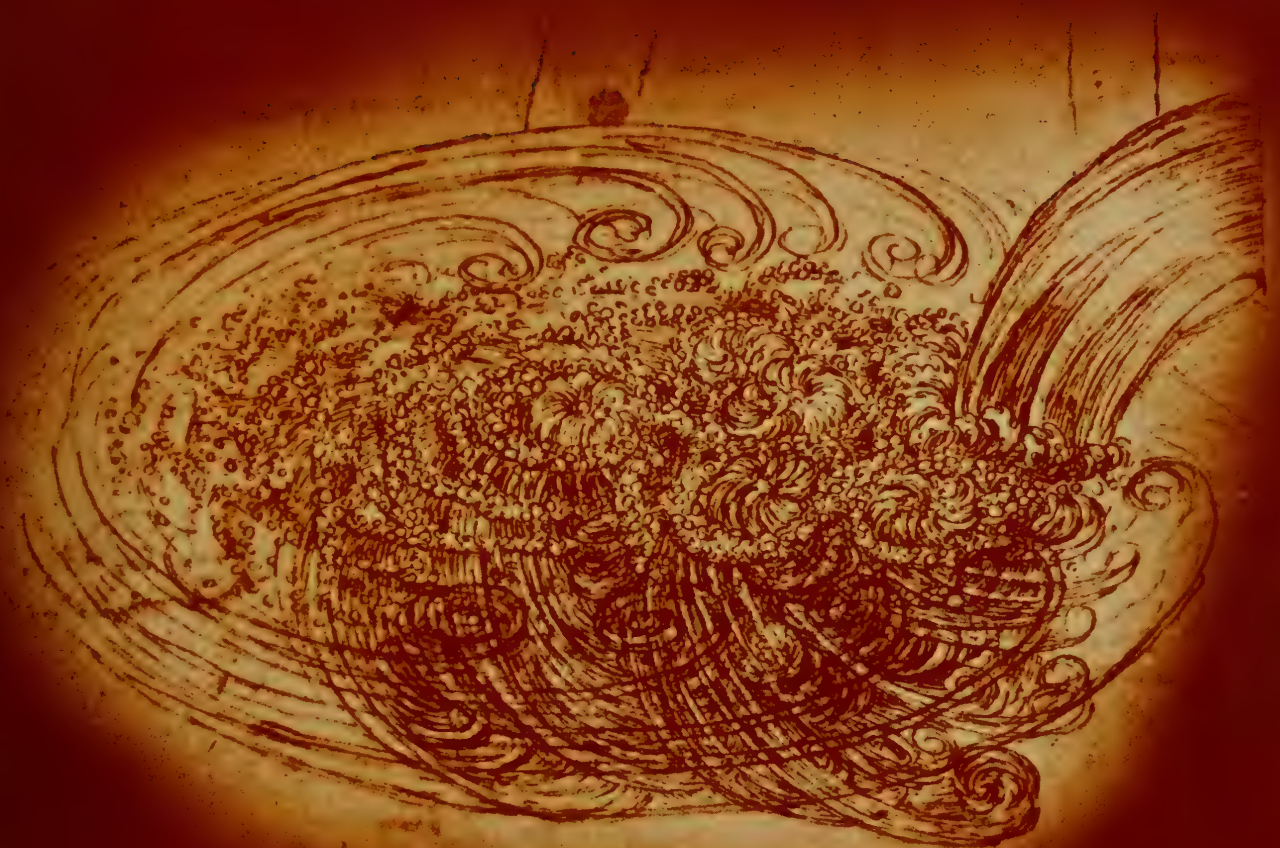
WG **WYMAN-GORDON**
WORCESTER, MASSACHUSETTS



V. 78 no. 2 (Sept 1974)
issued as WPI Undergraduate
Bulletin

OCTOBER 1974

WPI journal



Nuclear energy
The promise and the problems

Forging form and function
into metal
WG
WYMAN-GORDON

WPI journal

Vol. 78, No. 3 October 1974

3 **On the hill**

4 **Feedback**

5 **Intersession**

7 SPECIAL SECTION: **Nuclear energy — the promise and the problems**

8 **Yes, Virginia, nuclear power plants do affect the environment**
Dr. Morton I. Goldman examines the overall impact of nuclear power plants on the environment — and then compares the corresponding impact of fossil-fueled plants in this energy-scarce age.

14 **Nuclear reactors — safe or not?**
A leading nuclear engineer, Dr. Norman Rasmussen looks at the safety issues.

20 **Power Production and the public interest? What's that?**
Myron Cherry, a leading citizen action lawyer proposes a major restructuring of the federal power regulatory agencies to ensure public participation in the decision-making processes.

26 **Your class and others**

39 **Completed careers**

ditor: H. Russell Kay

'umni Information Editor: Ruth A. Trask

ublications Committee: Walter B. Dennen, ., '51, *chairman;* Donald F. Berth, '56; Robt C. Gosling, '68; Enfried T. Larson, '22; oger N. Perry, Jr., '45; Rev. Edward I. anson, '45

esign: H. Russell Kay

'pography: Typesetting Service, Provi- nce, Rhode Island

inting: Davis Press, Worcester, assachusetts

ldress all correspondence regarding edi- rial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1974 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster:* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI Alumni Association

President: W. J. Bank, '46

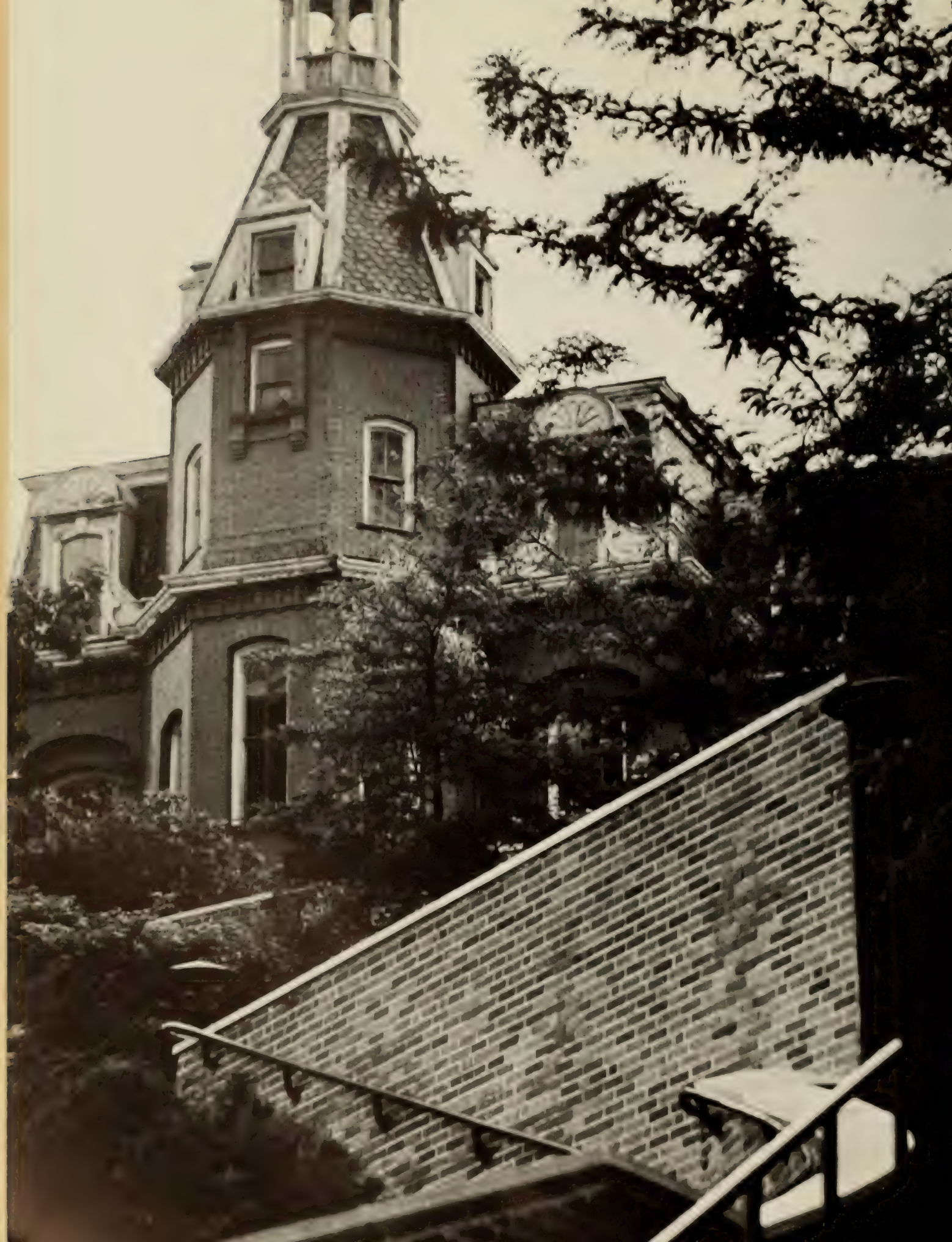
Vice President: F. S. Harvey, '37; W. A. Julian, '49

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr. '44

Executive Committee Members-at-large: B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55; L. Polizzotto, '70

Fund Board: W. J. Charow, '49, *chairman;* L. H. White, '41; G. A. Anderson, '51; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66



by the editor

New faculty

With the beginning of a new year, the campus seems to abound in new students. This year WPI also has an especially heavy influx of new faculty blood. There are 19 new members this year, out of a total of 173 full-time teaching faculty. This 11 percent change is almost three times the turnover a year ago.

Vice President and Dean of Faculty Ray Bolz attributes the large change to several factors. "There were five retirements, an unusually high number. Two of the faculty who left had only temporary appointments, and three more were accounted for in the Military Science department – they, of course, are rotated by the Army. In addition, several of our people had extremely attractive outside offers."

Musical offices

To an outside observer it may very well have seemed that the WPI administrative staff who inhabit Boynton Hall were playing some crazy sort of game this summer in which people and furniture were shuffled around from room to room.

All told, more than twenty people were shifted as Boynton Hall creaked and groaned and managed to accommodate a few extra people and office spaces.

One of the major undertakings involved enlarging the Admissions area to include a bigger waiting room, a special room for audiovisual presentations, a conference room, and an office for Financial Aid Director Edgar F. Heselbarth.

The space that Admissions got was taken from Business Affairs, as Controller William Barrett moved over to what used to be the Information Office and Vice President David E. Lloyd moved up to the third floor, taking what used to house the offices of the Worcester Consortium for Higher Education (now located downtown).

The Registrar's Office, bursting to the seams, was "enlarged" by removing the inside counter and building a shelf along the corridor wall below a window for counter service.

On the second floor, Academic Advising Dean John van Alstyne moved over two spaces. His old office was given to yours truly, and the scheduling office to University Relations, which reshuffled many of its office assignments to consolidate a staff which had grown with the addition of several part-time people during the past year.

All in all, it was a hectic summer. When you went away on vacation you didn't know quite what to expect when you got back. Blank walls suddenly had doors in them; walls and partitions moved and disappeared. But now it's over for a few years. . . . in Boynton. Come December, though, and a much bigger moving job begins when Salisbury Laboratories, possibly the busiest single building on campus, will be vacated so that it can be gutted and the insides rebuilt.

Four departments (Management Engineering, Computer Science, Life Sciences, and Humanities) will have to relocate in new homes for a year or two.

WPI publications receive awards

Four WPI publications have won awards in recent national competitions. The announcement poster for the WPI Plan to Restore the Balance was cited by the American Institute of Graphic Arts and by the American College Public Relations Association. One of its companion pieces, a 12-page booklet entitled "The Learning Environment" also received ACPRA recognition.

The unique, two-sided 1973-74 Spectrum poster won a silver medal from the Art Director's Club of Boston and an award from the American Alumni Council. The AAC also cited the letterhead of the Annual Alumni Fund for special merit.

Alumni trustee nominations open

For approximately fifty years, the Board of Trustees of WPI has granted to the Alumni Association the privilege of recommending to the Board three candidates per year for Alumni Term Trustee positions. Thus there are always fifteen alumni members of the Board who serve for a term of five years and may be re-elected once. It is one of the largest percentages of alumni on the Board of Trustees among colleges of comparable size in the country.

For the past three years the By-Laws of the WPI Alumni Association have provided for a Trustee Search Committee which is charged with the responsibility of recommending annually to the Alumni Council the name of at least one alumnus for each alumni vacancy which exists on the WPI Board of Trustees. The committee is composed of five members representing five decades of alumni. The Alumni Council each May nominates a candidate for each of the three positions and forwards these nominations to the Board itself for election.

In June 1975, Thomas B. Graham, '38, Lincoln Thompson '21, and Daniel F. O'Grady, '30 will be completing their five year terms on the Board. Only Mr. Graham is eligible for re-election, for Mr. Thompson and Mr. O'Grady have completed two consecutive five year terms and are now ineligible according to the By-Laws.

The By-Laws provide that there are two distinct ways in which alumni may participate in the selection of alumni members of the Board of Trustees. First is the actual proposal of an alumnus to the Alumni Council through the submission of a signed proposal. The mechanics of proposal are threefold.

Alumni chapters may propose candidates to the Council by submitting a signed proposal of fifteen signatures or more, together with a statement by the candidate of his willingness to serve, to the Trustee Search Committee. A second method is for any group of at least 25 alumni to propose a candidate by submitting a signed proposal, together with a statement by the candidate of his willingness to serve, to the Trustee Search Committee. For 1975 these proposals must be received by the Trustee Search Committee in care of the Secretary-Treasurer of the Alumni Association on or before Wednesday, November 13, 1974.

The second method for alumni to participate in the Trustee selection process is by suggesting names of alumni directly to the Trustee Search Committee for consideration. Each year this is a significant input of new names to the committee from which point they are researched and involved by the committee as it is deemed appropriate. It is the hope of the committee that a large reservoir of potential candidates who would be honored by this consideration can be maintained. Please contact any member of the Committee with such names or submit the names to Stephen J. Hebert '66, Alumni Secretary-Treasurer, c/o WPI Alumni Office.

The third method is for the Trustee Search Committee itself, which has the responsibility of assuring that there is at least one candidate for each position.

Formal notice is hereby given that petitions for proposing alumni for positions on the Board of Trustees are now being received and may be received by the Alumni Secretary-Treasurer on or before Wednesday, November 15, 1974. Sample forms for the proposal of candidates are available upon request from the Alumni Secretary-Treasurer.

The Committee thanks all alumni of WPI for their interest and involvement in this most important area which provides for the best possible members to be elected to the Board of Trustees of their Alma Mater. The Committee for the 1974-75 year is composed of C. Eugene Center, '30, Pittsburgh, Pa., Chairman; Francis S. Harvey, '37, Worcester, Mass.; William A. Julian, '49, McLean, Va.; Paul W. Bayliss, '60, Pennington, N.J.; and William J. Hakkinen, '70, Ledyard, Conn.

"From the Titanic to the Thresher," the announcement read, **"man has constructed great nautical masterpieces of obvious seaworthiness."** With that, the Create-a-Faire Committee from the interactive project center launched The Great Boat Race. Held in Washburn on September 19, the competition was "to construct and sail a uniquely designed aquatic vehicle, size restricted to less than 1½ feet in length." All materials were supplied by the committee, including styrofoam, pipe cleaners, pill bottles, potato chips (do you suppose this was meant as a construction material?), balloons, marbles, lead, and "large body of water."

About 25 students showed up to compete for prizes, consisting of playdough and lifesavers, awarded for Grand Design, Most Aesthetic, Cleverest, Fastest (with wind-power and non-wind categories), Most Absurd, and Biggest Dud

Letters to the editor are welcome. All points of view can find a forum in this section, and we encourage the free exchange of ideas and opinions here. For reasons of space, variety, timeliness, and interest to other readers, we may not publish all letters received and we occasionally use portions of letters, but those that do appear here are an accurate reflection of the Journal's mail.

Completed Careers too heavy on careers

Could Completed Careers be modified so that we are saying our graduates were more than job oriented? Surely these men and women married, had families, hobbies, and outside interests. Surely the record of their life is not only the positions they have held!

Prof. Betty B. Hoskins
WPI Life Sciences

Energetic applause

I wanted to take a few minutes to tell you how much I enjoyed the "Energy" articles in the August 1974 issue. I usually read "Your Class and Others," "Completed Careers," and after scanning the major content toss the *Journal* into the basket.

However, this month I read the articles by Dr. Teller and Dr. Glaser with interest. They were current, right to the point, and of interest to everyone. In fact I would like your permission to distribute copies to the Science Department Heads of the Worcester Public School System.

Richard G. Bedard, '57
Worcester, Mass.

The August issue was a great issue. The two articles on energy were good and I am looking forward to the next issue.

I would appreciate receiving from you two more copies of this issue for use with associates in our electric utility.

William E. Eaton, '38
Eugene, Oregon

INTERSESSION

Intersession — that joyous experience in diversity you have come to know and look forward to each year — will return to campus January 6-17 for a two-week run. Once again, WPI will offer to students, alumni and the community at large a wide variety of courses to further their professional competence, advance their avocational interests, offer intellectual enrichment, provide personal enjoyment and, perhaps most importantly, get to know one another.

The list here is representative of the total offerings for Intersession '75 and represents approximately one-third the total number of courses to be given. Your inquiry is invited and your participation hoped for. For further information, contact the Director of Continuing Education, Boynton Hall 310J, WPI, Worcester 01609.

Schedule

The schedule for Intersession 1975 is as follows:

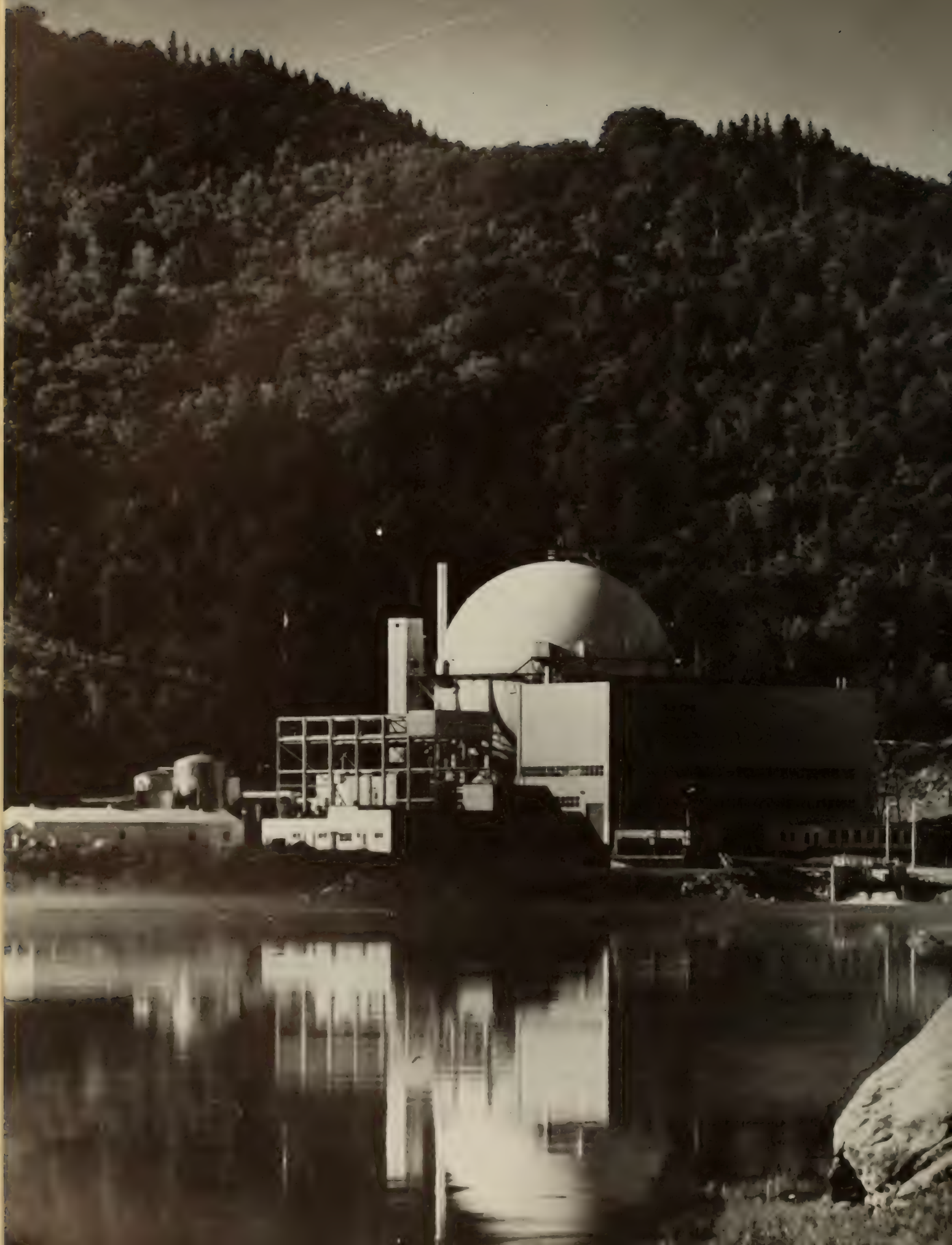
Session A	*January 6 – 8*	*(M, Tu, W)*
Session B	*January 9 – 14*	*(Th, F, M, Tu)*
Session C	*January 15 – 17*	*(W, Th, F)*

Registration

Visit, phone, or write the Office of Continuing Education (Boynton Hall 310) to register for Intersession. Some courses have low population limits so early registration is encouraged. Registration will not be considered complete until the total fee has been received. Tuition rates are as follows:

$115 — Regular
95 — Regular early registrant (on or before December 20)
80 — Alumni, WPI evening students and parents of WPI students
30 — Courses printed in bold-face (darker) type
450 — Group rate for 6 people (if registered on or before December 20)

ABC504	Scanning Electron Microscopy in Biology
BC517	Using the IBM Scientific Subroutine Package (SSP): Programming and Mathematical Aspects
B518, C518	Introduction to Wines
A527	The Elements of Programming Style
A528	Micro-Computer Applications
A529	Engineering Economy
A531	Audio Amplifier Design
A533	Human Engineering
A534	Metric Workshop
A539	The American Indian in Literature
A545	Mathematical Models in the Social Sciences
A547	The Pianoforte—Its Care and Maintenance
A550	**Astronomy**
A552	Superconductivity
A554	**Ballroom Dancing I**
A565	Data Base: Concepts, Design and Management
B528	**Astrology**
B529	**Occult Religions and Psychic Phenomena**
B531	**The Political Economics of Energy**
B532	**Investment Philosophy**
B535	Introduction to Loudspeaker System Design
B536	Scanning Electron Microscopy
B537	**Solar Energy**
B538	Environmental Measurements
B542	On Reading Joyce's *Ulysses*
B546	**Rock Hounding**
B548	**I Corinthians**
B554	The Art of Near and Middle Eastern Dance
C527	Introduction to the PDP-10 for Non-Computer Scientists
C528	Introductory Analog Computer Programming
C529	Accounting for Managers
C530	**Income Tax Preparation for Individuals**
C531	**Survey of Everyday Law**
C533	Building Design for Fire Safety
C534	The Synthesis of Design
C541	Survey of Biomedical Engineering
C544	Operation Logistics
C545	**Ethics and Technology**
C546	Celestial Navigation
C547	Neutron Activation Analysis
C549	Introductory Photoelasticity
C550	Practical Astronomy
C552	The Ancient Art of Backgammon
C557	**Heredity and Environment—the Jensen Controversy**
Special	AEC Citizens Workshop on Energy—3-hour workshop to be presented several times during Intersession at no cost to participants.



Nuclear energy — the promise and the problems

THE ENERGY SITUATION continues to be a major problem for the United States. Project Independence, the announced national goal of becoming energy self-sufficient by 1983, has caused considerable debate. Many knowledgeable people doubt that this goal can be achieved; if it can it appears that we will require a massive commitment to the generation of electrical power by nuclear reactors.

This is a sensitive subject to many. There are concerned, strong, and highly vocal advocates for and against nuclear power. The issues involved cover the range from environmental damage to radiation hazard to economic factors to fuel security to conflicting interests among the power producers. The pro-industry faction is opposed by many consumer and citizens' groups.

WPI's involvement with nuclear reactors goes back to 1959, when the open-pool reactor was installed in Washburn. Nuclear engineering is an established graduate degree program, and courses are also available to undergraduates. In 1971, the college sponsored an evening course entitled "The Nuclear Power Controversy." The fourteen-week series was videotaped (with the aid of a grant from Yankee Atomic Electric) and has since been made available to colleges and high schools all over the Northeast. The increased social conscience and awareness of the faculty and students have led us here at WPI to examine all sides of the question. (There may be some irony in the fact that a part of the Interactive Qualifying Project Center is at times off-limits to people because it is located directly over the radiation cone of the Washburn reactor.)

So this issue of the *WPI Journal,* as promised in August, takes up the nuclear energy situation. The three articles presented here, like the two before, stem from the year-long series of guest lectures arranged last year for the mechanical engineering department.

I don't pretend that five articles and some 25,000 words can adequately begin to cope with the energy situation except in the most elementary way. I must further acknowledge that this series is an "import" – it happened at WPI, but it does not represent the words or the work of WPI people. There are hundreds – perhaps thousands – of WPI alumni who work in the energy production and distribution field. I'd like to hear from some of you about your reactions to this series – good, bad, indifferent. There are some major areas (coal, for instance) that have been only lightly touched. If you're involved in one of these, you have a valuable point of view that I invite you to share with other *Journal* readers.

– R.K.

Yes, Virginia, nuclear power plants do affect the environment . . .

by Dr. Morton I. Goldman

Everyone is concerned with the environmental effects of nuclear power plants — but have you ever stopped to consider the effects of not going nuclear, of building enormous new fossil fuel plants?

Dr. Morton I. Goldman is senior vice president of the Environmental Systems Group of NUS Corporation, Rockville, Md. He is responsible for all the site, environmental, waste disposal, and safety activities conducted by NUS at over fifty nuclear and fossil-fueled plants in the United States and abroad.

Before he joined NUS in 1961, he spent eleven years with the U.S. Public Health Service, working for several years at Oak Ridge National Laboratory on waste disposal research and two years as a nuclear installation consultant from the PHS to state agencies.

He has been chairman of the Committee on Sanitary Engineering Aspects of Nuclear Energy of the ASCE, and was a member of the group that drafted the radioactivity section of the PHS drinking water standards issued in 1962. In 1968 he chaired a panel convened by the International Atomic Energy Agency. He is currently active on several committees of the American Nuclear Society.

Dr. Goldman is a registered professional engineer in New York, Maryland, and the District of Columbia. He holds advanced degrees in sanitary engineering and nuclear engineering from M.I.T.

THERE ARE TWO big problems in discussing the environmental impact of nuclear facilities. One is the difference that exists between what I'll call the absolute value of an environmental impact and the perception of an impact by a particular group or an individual. If I can state that th impact of a facility in absolute terms is the entrapment and death of 1,000 fish of a given species, that's an impact. However, it perception may well vary between the different people who are involved in looking a that number of fish of that particular species. For the Isaak Walton League it may b nearly the end of the world. For the power plant operator, it's one of the smaller number of fish kills that we've had. For the stat resources agency it may be hardly any difficulty, although they recognize that something has happened.

A second area of difficulty in dealing with environmental impact of nuclear facilities is encompassed by the scope — how broad an area of consideration you include in determining the impact of a nuclear generating station. To some it would be the impact of the construction and the operation of that station on its own local environment. Other people have suggested, and in fact demanded, that looking at an isolated nuclear power station is not sufficient, that i is necessary to consider the total impact of the nuclear fuel cycle from the mining of the uranium through the refining and processing, enrichment operations, fuel fabrication, the use in the reactor, transporation of the spent fuel to a recovery facility and the effluents associated with that facility, as well as the ultimate disposal of the radioactive wastes produced. Other people will go still further and say that we should not only look at what the normal operating modes of these stations are but also ought t consider the range of accidents that are asso

ciated or potentially associated with them – "what if" kinds of considerations which may range from accidents at stations to diversion of fissile material, somebody stealing a truck of spent fuel and manufacturing his own private arsenal. So there is quite a range in what might be covered in assessing the environmental impacts of nuclear generating facilities.

The themes I will discuss here include the environmental effects of power generation, that is nuclear power generation with a primary focus on thermal and radiological effluents, since these encompass most of the question which are normally asked about nuclear power plants and which are primarily dealt with in impact assessments. I will also discuss the nuclear fuel cycle, particularly in the area of the disposition of high activity fuel reprocessing wastes, about which there have also been signigicant discussion. The areas that relate to accidents deserve an entirely separate discussion, and the next two articles, by Professor Rasmussen and Mr. Cherry, will cover that ground. I should stress that the radiological and thermal areas are not the only impacts associated with energy generation. The considerations that would enter into a fossil plant's environmental report are not greatly different that those we would look at for a nuclear facility. Basically, the areas involved, aside from the construction of the facility, include resource extraction, transportation, waste heat, and transmission of the produced energy from the facility. Combustion residues could be loosely interpreted to consider the radiological area. I'm not proposing to deal with resource extraction for nuclear facilities as compared to fossil fuels, although I'll have a few comments later. Transportation is certainly an issue in both instances; 100-car coal trains or huge supertankers coming from the Middle East have their own environmental impacts. As far as transmission is concerned, the people who live along a right of way don't have any idea whether the electricity in those lines comes from a steam plant, a hydroelectric plant, or from a nuclear plant. They don't normally like the transmission lines, but that's not a nuclear problem. The waste heat question does have some special aspects that are associated with nuclear facilities, and obviously the equivalent of the combustion residues are also specifically nuclear insofar as they involve radioactivity.

Before going on to discuss the impact of nuclear facilities in greater detail, it would be helpful to review briefly the kinds of nuclear power plants that are currently being operated or built in the U.S. There are two types of reactors moderated and cooled by light water which have been widely accepted for power generation. In the boiling water reactor, the core consists of a latticework array of perhaps thousands of rods, each a centimeter or so in diameter, arranged in assemblies called fuel elements; these in turn are located in this lattice to form the reactor core. Each rod, which may have an active length of about 4 meters, consists of a number of pellets of only slightly enriched uranium in the form of uranium dioxide (a ceramic, high sintered material) stacked inside a sealed tube commonly made of a zirconium alloy. The zircolloy cladding and the fuel serve to retain the fission products generated within the fuel and to inhibit at least their release into the rest of the system. In the boiling water reactor concept, steam is generated directly in the reactor vessel. The water coolant is allowed to boil; it travels to the turbine, turns the turbine, is condensed by some external cooling water, and returns to the reactor vessel. One of the more significant aspects of this particular type of nuclear power plant is that any radioactive gases that may be released from the core have a straight shot through the turbine to the condenser system. The condenser is usually maintained under a vacuum in order to improve the thermal cycle efficiency, and that vacuum will remove any gases that are evolved from the core and take them out of the circulating system. In the older plants, and in fact in almost all of them currently operating, these gases were vented after a relatively short delay to a tall stack, usually on the order of 300 feet, from which they were dispersed into the environment. This is not being done any more.

The other kind of light water reactor in common use in the U.S. is an indirect cycle, pressurized water plant, in which sufficient pressure is maintained in the primary system to keep the water from boiling. The hot water is circulated through an external heat exchanger or steam generator secondary system where steam is generated to turn the turbine. There is nominally a high degree of isolation between the reactor coolant circuit and the steam circuit or secondary side, and the isolation, at least to some extent, serves to eliminate the source of radioactive waste gas that is present in the basic boiling water reactor concept. The pressurized water reactor has its own particular problems with potential avenues of escape for radioactivity. For one thing, the system normally employs a dissolved chemical, boric acid, in the reactor coolant water to control reactivity (neutron fission rate in a gross sense) over a core lifetime. In the process of absorbing neutrons and doing its function, the boron, at least in part, is converted to an isotope of hydrogen called tritium which in turn combines with oxygen in the water to form tritiated water. Tritium is not a particularly large biological hazard, but it does present some special problems in waste management because there is no feasible way of separating tritiated water from ordinary (or light) water. Another difficulty that has been encountered recently in several plants relates to the steam generator itself, which in practice turns out not always to be isolated from the reactor coolant. Steam generator tubes leak, they corrode, and there have been occasions in which radioactivity has been transferred from the primary circuit to the secondary circuit where radioactivity is really not supposed to be in the first place.

A third type of power plant is becoming very slowly more accepted – the high temperature gas cooled plant. In this type of plant the moderator is composed of graphite, and helium, rather than water, is the coolant. The combination of the graphitic core material and the helium gas coolant allows the reactor to operate at a much higher temperature than the light water reactors can achieve using present fuel materials. The heat from the helium reactor coolant, transferred through a heat exchanger to a secondary water circuit, produces the steam which drives the turbine. The combination of the material properties and coolant properties results in a significantly higher thermal efficiency for these plants with a resulting decrease in heat rejection to the condenser cooling water. The first moderate size unit of this type, about 300 megawatts, is about to begin operation in Colorado.

Considering the current problems in dealing with 30 to 35 million tons of coal ash every year, the disposal of nuclear wastes is a small problem.

The sources of radioactive materials, the things that we're concerned about, include fission products produced by fissioning uranium, activation products, and corrosion products. The latter two are artificial materials that are created by exposing stable elements in the core and coolant to the neutron flux. The fission products are by and large maintained within the fuel and its cladding. Small quantities of uranium normally will be present on the surface of the cladding, and this so-called tramp uranium will

release some fission products into the coolant. But the most significant source of activity will arise when there are minor defects, pinholes, and the like in the fuel cladding itself; then gaseous fission products, volatile fission product elements will migrate from the hot fuel to the coolant. Of the three sources, the fission products are the major headache in a nuclear plant. Almost all operating plants at the present time have had some small fraction of fuel elements which have had defects in them, and usually the practice has been to design waste handling systems which are capable of managing quantities of radioactivity and volumes of both gas and water which are greater than those expected during the plant's lifetime.

In view of the unfortunate way in which nuclear energy was introduced to the world, it's perhaps not surprising that the nuclear power industry is the only one in the history of technology in which regulations for control and standards preceeded the establishment of the industry. As a very quick comparison, it's very easy to recognize that it is only now, within the last few years, that we're getting standards and criteria for atmospheric pollution resulting from burning of fossil fuels – many, many years after the problem was first recognized. The first air pollution law, as a matter of fact, was written in 1493. Queen Elizabeth I didn't like the soot in London and forbade the burning of sea coal at that time. The penalty for burning sea coal, or even for selling it, was hanging followed by drawing and quartering in the public square. That's a little bit harsher than some of the things we get into now. But nevertheless it has been only in the last two years that we've had standards for both ambient concentrations and emission levels of sulfur and other pollutants from fossil plants.

The standards and criteria for radiation exposure of members of the public have been in fact unchanged since 1954, about three years prior to the start-up of the Shipping Port plant, which was the first one to produce electric energy on a pseudo-commercial basis. These radiation protection standards have been established internationally by the International Commission on Radiological Protection and are essentially followed by all nations. We and the Soviet Union agree on the recommendations of the ICRP. In the United States we have our own National Council on Radiation Protection and Measurement which was formed in 1930 or 1931, at least a few years before AEC was founded. The Federal Radiation Council was established in 1959 and in 1960 it essentially adopted the same international standards. The National Academy of Sciences in 1955 and in 1960 also reviewed the then-existing standards and supported them. All of these national and international agencies have agreed upon the basic radiation protection standards for members of the public, standards essentially unchanged since 1954.

In view of the unfortunate way nuclear energy was introduced to the world, it's not surprising that the nuclear power industry is the only one in the history of technology for which regulations and standards preceded the establishment of the industry itself.

All of these standards provide for a maximum dose to an individual in the general public of 500 millirem or 0.5 rem per year. For those of you who may not be particularly familiar with the radiation literature, this is about equivalent to five chest x-rays per year. To account for individual variability, the United States through the Federal Radiation Council adopted the practice of using a value of about one-third of the individual standard, or 170 millirem per year, where it is impossible to monitor individuals (as is the case so far as the public is concerned). To cover this individual variability and the possibility that one person may be more sensitive by a factor of three, say, than the average, the practice has been to use this 170 millirem per year for individuals. In order to control exposure to large population groups, in which the genetic effects on the gene pool of the entire population is important, a limit to all sources of radiation of artificial origin except for medical exposure of 5000 millirem or 5 rem over a thirty year period has been specified by the International Commission on Radiological Protection and adopted by the U.S. This is identical to the 170 millirem per year described earlier for individuals.

However, from the original inception of radiation protection standards for the public, both national and international organizations have specified that exposure should be kept as far below these limits as practicable. This precept has been applied by the Atomic Energy Commission in two ways. The first is by establishing discharge limits for power plant sites which are conservative, by which I mean that if one were to discharge at the authorized limits, the radiation exposures produced to the public would be substantially lower than the 170 millirem limit per year specified. The regulatory staff does this by generally granting, as an example, substantially less credit for atmospheric dilution than a site meteorological program would indicate. The AEC creates some very interesting locations and habits of the people who live next to power plants. They will have somebody sitting naked on a fencepost downward for 365 days a year, 24 hours a day – that is the individual who is the limiting case, even though I don't know of anybody who behaves like that, particularly on a day like today. They will specify that one has to consider a cow tethered to this fence-post, grazing on grass located in the most exposed downwind location, and from this cow an infant chained to its right hind leg continually sucks milk. They assume that you will obtain your drinking water directly from the discharge pipe, not from the river or the lake into which the plant discharge. You are just so eager to get this stuff that you can't wait for it to be diluted in the natural environment. (I don't know of anybody who does that either.) And all of the fish that you eat are born, raised, and caught in the discharge line before any environmental dilution. So using these kinds of assumptions the regulatory staff of the Atomic Energy Commision works backwards and says these are the allowable limits then for discharges from this plant. Needless to say since there are very few, if any, locations at which we have either the naked fellow on the fence-post or the infant chained to the cow's right rear leg or people drinking water from the discharge line prior to dilution, the radiation exposures received from discharges to real people at real locations living in houses going to work, moving away from the plant having cows on feed or indoors or perhaps even no cows at all – the actual doses to actual people are substantially lower than those that would correspond to the 170 millirem dose limits. That's the first way in which the regulatory staff applies this "as low as practicable" philosophy.

The second way has been to require process equipment capability in the plant which is more than ample to reach the discharge limits that they've set. So that you have to have equipment in plant which would meet those conservatively established discharge limits under conditions of plant performance (fuel failures, equipment outages, etc.) which would require the plant to be shut down for other reasons such as too much radiation in the plant for people to stay there. Now the success of the approach employed by the Atomic Energy Commission has been demonstrated by the accumulated experience at operating nuclear power plants. With one or two exceptions, there has been no measurable or significant change in radiation exposure to plant neighbors before and after these plants have started operations. The only

exceptions are some early boiling water reactor plants with the problem I mentioned earlier, where poor fuel performance resulted in measured increases in site boundary doses from gases released as a result of the defective fuel. As I also mentioned, all boiling water reactors are either currently being built or back fitted with additional hold-up capability for those gases. Other than these few execptions, plant releases have been only a few percent of the discharge limits, and the discharge limits themselves correspond to radiation exposures substantially below the standards.

In 1969 and 1970 controversy developed in this country about the validity of the radiation protection standards and the potential radiological effects of a nuclear powered economy on the U.S. This controversy was fueled initially by Dr. Sternglass at the University of Pittsburgh and carried on and expanded by Drs. Goffman and Tamplin of the University of California Livermore Laboratory, using (at the very best) questionable biological extrapolation and just plain wrong physical extrapolation. Their lecture tours, if I might describe them that way, stimulated quite a bit of activity and interest, including congressional hearings and a few other things. They also stimulated a review of the available biological data and standards by the National Academy of Sciences which set up a committee on the biological effects of ionizing radiation, the BEIR Committee, to examine where we stood and what we knew and what we didn't know about radiation effects.

They will specify that you have to consider a cow tethered to this fencepost, grazing on grass located in the most exposed downwind location, from which an infant chained to its right hind leg continually sucks milk.

They will have somebody sitting naked on a fencepost downwind of a nuclear plant for 365 days a year, 24 hours a day — that is the individual who is the limiting case.

Before this committee came in with its answer however, the AEC came out with a new rule, decreasing by about 100 times the allowable radiation discharge limits. This rule, which provides numerical guidance to the as low-as-practicable philosophy, was justified by the AEC regulatory staff on the basis that the excellent operating experience accumulated up to that time showed that this was in fact a practical goal to set up. That is sort of analogous to saying, if you can run a car at 5 miles an hour and its obviously safer than at 70 miles an hour, why not run them at 5? However, when people who were interested, and that includes about everybody from the environmentalists to the utility industry to their suppliers and engineers, looked into this there appeared to be a few worms still remaining in the can. One of the worms turned out to be the very clear indication that the regulatory staff in practice proposed to employ the same approaches to individual plant licensing as they had in the past – first, to establish these discharge limits in a very conservative way with the cow and the naked people and everything else, and second to again require the in-plant process systems be capable of dealing with more than what you would expect to see. These approaches used with the original limits had resulted in experience that generally ranged about a few percent of the older limits. However, applying the same philosophy to the new limits, lower by a factor of 100, would not only be very expensive if they resulted in the same kind of margin, they might very well be *less* favorable from a biological point of view.

Now this proposed rule has been contested, not only by environmentalists but by the utility industry and by the State of Minnesota since January of 1972. The position of the utilities generally speaking has been that the proposed rule alone is, with minor modifications, desirable and acceptable but that when it's combined with the conservative implementation that the bureaucrats on the regulatory staff use, it's not justifiable from either an economic or more importantly from a health standpoint. In this instance we're looking at almost a classic cost-benefit analysis. But in order to explain these points I would like to use a unit of population radiation exposure, the man-rem (or these days, the person-rem), which is simply the sum of distribution of people and their exposure. Or another way is the product of the average dose per person and the number of people so exposed. Thus natural background radiation in the U.S. is about 1/10 rem per year. There are 200 million people in the U.S. So the U.S. population dose from natural background is the product of these two, or about 20 million person rems. Under the assumption, and I would stress that it is only an assumption, that any radiation exposure regardless of the level of dose or dose rate, is equally harmful per unit dose, then the population dose is a measure of risk or harm.

From the environmental point of view, natural radiation is about 100 to 102 millirems per year. Fallout contributes 4. In 1970 nuclear power contributed 0.003. Medical diagnostic exposure contributed 72, radiopharmaceuticals 1, miscellaneous 3. The total is about 182 average millirems per capita per year. In person-rems, about 21 million from background, 700 from nuclear power. Nuclear power then contributed about 16 millionths of the total per capita radiation dose in the U.S. In 1970, under the miscellaneous area, one can estimate that commercial air travel in the U.S., which was some 104 billion passenger miles traveled at an average speed of 350 miles per hour, resulted in some 300 million passenger hours exposed from cosmic rays at a rate of about 0.3 millirem per hour or a population exposure of some 90,000 person-rems. That's over 100 times more radiation from flying in jet aircraft than from nuclear power in the same year.

In looking ahead to the year 2000 which seems to be popular with a lot of people, nuclear power in that year is projected by the Atomic Energy Commision to be about 38,000 person-rems per year. The National Academy of Sciences said about 51,000 – not very greatly different. And either figure, or in fact the sum of both! – is less than the general public got from air travel in 1970. If air travel patterns continue the way they have been, air travel will still be a substantially greater contributor to overall population exposure than will nuclear power. One deficiency in both the AEC and the National Academy of Sciences view of the future from radiation exposure is that both neglect exposure incurred by nuclear plant operating staffs. Present experience is highly variable, but data assembled by the United Nations Scientific Committee on Effects of Atomic Radiation, by ICRP, and

In 1970, nuclear power contributed about 16 millionths of the total per capita radiation dose in the U.S. Commercial air travel contributed over 100 times more radiation exposure.

by ourselves indicate that a mean in-plant exposure of about 1.4 person-rems per megawatt year of nuclear electricity is obtained in nuclear plants. If this value is maintained, the average contribution to person-rems, about 15 to 20 times what we're looking at here for the general public. If this projection holds, and there is no reason to suspect substantial reduction of in-plant exposure unless we radically change the way we design and build nuclear power stations, it is the view of many that overly restrictive discharge limits may increase the overall population dose rather than decrease it. This is a classic case of squeezing down on the balloon one place and having it pop up somewhere else. Since the overall biological insult to the U.S. population, in a genetic sense, is directly related to the population dose to any and all segments of the population, the proposed restriction by AEC is much more likely to harm than to help. And the difficulty is that they have refused, at least to this time, to recognize the fact that restricting discharges does imply an increase in in-plant occupational exposure.

This rule on discharges will result in substantial additional economic cost, because taking out the last 2 percent of anything usually costs as much as removing the first 98 percent. And if in addition to that it results in an increased population insult, from a genetic viewpoint, any rational consideration must reject that proposal as undesirable. Even the National Academy of Sciences expressed their view on this point. "The public must be protected from radiation, but not to the extent that the degree of protection provided results in the substitution of a worse hazard for the radiation avoided. Addtionally, there should not be attempted the reduction of small risks even further at the cost of large sums of money that spent otherwise would clearly produce greater benefits." At an estimated cost of something like $5-7 million per nuclear plant per year, from any municipal or corporate sense that is money down the drain since the same people who are asked to pay the utility rates to cover the cost of these systems are also the same ones who are asked to finance sewer bonds, school bonds, water supply bonds, etc. In any event I think it is clear to anyone at all who has taken a significant look at the situation of normal radiation discharge from nuclear power plants that there is no environmental impact worthy of the fervor, newspaper space, or TV time that has been devoted to this issue.

There remains, so far as nuclear plants are concerned, the question of heat discharge, a problem common to all steam electric stations, whether fossil or nuclear. The 1969 average thermal efficiency for all U.S. fossil plants was about 33.2 percent. This results in slightly over 2 kilowatts of heat being rejected for every kilowatt of electric energy generated. Now of this total heat rejection, about 15 percent goes via the stack gases and the remainder via the condenser cooling system. Since nuclear reactors do not reject heat via combustion gases, essentially all of the waste heat is rejected to the condenser cooling water. Present light water reactors operate with an efficiency of about 32 percent, which is only slightly worse than the U.S. average for 1969; but since there are no stack gases, all of the waste heat goes into the water and that results in a larger heat rejection to the water environment than is the case for an equivalent fossil plant. The best U.S. fossil plant has a thermal efficiency of about 40 percent, again with heat rejection both to stack gases and to the water. The high temperature gas cooled reactor also has an efficiency of about 40 percent, but again without stack gases to remove at least a portion of the waste heat. All of it goes to the water, so the HTGR, although thermally equivalent to the best U.S. fossil plant at the present time, will reject more heat to the water environment. It is estimated that the breeders may run with efficiencies of somewhere between 45 and 50 percent, which will reduce the heat rejection below that currently attained with the best fossil plants.

The combination of lower thermal efficiency and large unit size for central station plants has resulted in a more difficult situation. There are relatively few fossil plants that have been proposed for and certainly not operated in the past for 2,400 megawatts of electric energy. Nuclear plants are quite commonly attempted to be sited with as many as possible on one site, because sites are getting hard to come by. The waste heat issue has been raised primarily in association with nuclear power plants, but the difference between nuclear and fossil steam plants is literally just one of degree, which relates both to thermal efficiency and station size. For the present, techniques are available for controlling the discharge of heat to the water environment on its way to the atmosphere (which is, after all, the ultimate repository for waste heat). Once-through or open-cycle cooling has been the method most frequently chosen to transfer rejected heat to the water environment. This system can be most effectively employed on large water bodies with which the heated discharge flows can be rapidly mixed. However, certain environmental factors must usually be considered in the particular design. For example, if fish spawning occurs in the vicinity or if there are large numbers of young fish, the intake structure must be located and designed to minimize entrainment of larvae and fry. I saw some interesting examples of studies going on over here at Alden Research Labs related to this. Similarly, return of the discharge water via a long canal for example may not be most desirable in those circumstances where winter shutdowns may result in large fish kills due to thermal shock. That has happened at Oyster Creek on a few occasions. Submerged discharge lines using multiport jet diffusers can avoid that problem as well as produce such rapid mixing that surface areas of only a few acres are produced in which water temperatures are as much as three degrees above the ambient temperature.

Cooling towers are frequently suggested as alternatives where once-through cooling isn't feasible. These discharge the heat directly to the atmosphere. However, these alternate methods of heat rejection also have their own disadvantages which need to be weighed carefully before a choice is made. The economics aside, natural draft cooling towers may be as tall as a forty to fifty story building, and the plume that they produce is a hell of a lot taller. They're not exactly unobtrusive.

These and the lower profile mechanical draft towers discharge a considerable amount of water vapor to the atmosphere, which can have significant climatological effects in the vicinity of the station. It's not unusual in Europe, where stations are built very much closer to highways and roads, to come across a stretch of ice on an autobahn when you're doing 160 kilometers an hour because the cooling tower plume has been across there in the winter time. In cold, humid weather the likelihood of fogging and precipitation is increased; around some plants in cold climates it's a little hard to see anything becaused the plume is right overhead. These towers have created icing problems on nearby plant structures, roads, and streets. There is a 2,900 megawatt fossil generating station in Germany, the largest fossil plant entirely on cooling towers in the world — and it's wet there. Farmers like it, but I don't know that anybody else does.

In addition to cooling towers, ponds or lakes are another alternative. These require substantial land areas which, depending on the climate, may average 1 to 3 acres of water surface per megawatt of plant capacity. Thus a plant with 1,000 megawatts of generating capacity might require as much

as 3,000 acres for a cooling lake or pond. This area can be reduced by using power sprays to augment heat transfer but with an increased consumption of water. And these ponds do create some local fogging on cold days due to the evaporation. The potential impact of these thermal discharges is open, shall we say, at the present time. On an individual plant basis there have been plants of substantial size that have been operating for a number of years without observable effects as a result of heat dissipation or heat discharge. There have been other plants located poorly, with the wrong kind of cooling system, which have resulted in substantial damage to streams. Means are available for mitigating those kinds of circumstances, but we appear to be caught up in another kind of hysteria which is similar to the Atomic Energy Commission's on the radiation issue, and that is the Environmental Protection Agency and its potential guidelines for steam plant discharges of heat. We have no idea at the present time of how the EPA is going to deal with the requirement of Congress that the best available and the best practicable technology be used by 1983 with the goal of eliminating all discharges into water. However, a draft report of the contractor for EPA who reviewed the state of the art recommended in their view the technology that they considered to meet these criteria, that cooling toweres be used on essentially all plants, regardless of location, size, age (with a few restrictions). This recommendation did not consider whether the substantial consumptive use of water by evaporation in such towers would be more harmful than the heat in water-short areas, whether the local topographic or climatic condiditions would produce fogging or icing hazards, whether the salt drift from towers on brackish or salt waters might cause agricultural damage and enhance corrosion. It did not consider any of these. If there is any environmental impact area at all in which decisions logically must be site-specific, it is in the area of thermal effects but as yet we have no information as to whether the proposed guides emanating from EPA will reflect this logic or some mysterious workings that go on in Washington.

The final area of environmental concern is radiological, and is concerned with the spent fuel reprocessing. Despite the recent attention to the subject, I should point out that it's not exactly new. Almost twenty years ago I was conducting research and development work on chemically inert forms for high activity fission product wastes, first at Oak Ridge and later at M.I.T. The other way of controlling high activity wastes other than conversion to a chemically inert form involves putting them in a regime in which they are isolated from the biosphere. It was back in 1954 when the National Academy of Sciences recommended bedded salt formations as the type of geologic structure most likely to provide the degree of isolation desired. During the years between then and now, work has been underway to develop optimum solidification methods and sites for the wastes projected to be developed in the future. There was a controversy that involved AEC a few years ago (in fact most of the controversies involve AEC's own activities rather than those of the utilities). There was a problem a few years ago following a disclosure that a salt mine in Kansas that the Commission had been using for the field-test program on salt as a disposal medium and was considering as an ultimate repository was not in fact acceptable for that purpose because of mineral explorations that had been made for gas and oil in that area which had punched a few holes into or near their proposed storage area. To provide assurance that there will be some place to put the first waste loads that are coming in the early 1980s, the AEC is proceeding with a plan for constructing engineered surface storage facilities while these other salt bed regions are being examined for suitable repository sites. Although storage facilities will receive only solidified waste, they're being designed to provide complete isolation of the stored material from the environment under essentially all foreseeable circumstances. We should really keep in mind that the volume of wastes to be stored is not really very large. The total volume projected to be produced for storage by *all* nuclear plants through the end of the century, there's that magic year again, is about a million cubic feet, or basically a large ballroom full, about 200 by 200 by 25 feet high. Considering the current problems we have in dealing with the thirty to thirty-five million tons of coal ash every year, this is a rather small-scale problem, even when we consider the toxicity and the time scales involved. Consider for comparison the relatively primitive engineering techniques that were available to the pharaohs; they built pyramids which protected essentially the same kind of volume we're talking about for periods on the order of 3,000 to 5,000 years, which is about what we have to aim for. And if we can't do it better now than the pharaohs were able to do it then, then we really have not progressed very far.

In concluding I think a few remarks about the role of nuclear fuels might be appropriate. There is a basic problem in attempting to rely solely or even very much on fossil fuels. Gas, which is certainly the most desirable fuel from an environmental viewpoint, is in far too short a supply to be used at new central stations, and even existing ones are having a great deal of difficulty in getting it. Oil, whose use has increased rather dramatically in response to requirements for lower sulfur emissions and particulate emissions, was seriously threatened even before the 1973 Arab oil embargo and the dramatic increases in prices. The U.S. holds about half of the total world reserves of coal, about 600 or 900 years' worth of our use at current usage rates. But coal has become a dirty word, literally as well as figuratively, due both to the resouces extraction problems and to the sulfur problems associated with it. It may be that the sulfur problem will be successfully dealt with within the next few years, but current attitudes on surface mining (which affects well over half of our low sulfur coals) may eliminate a very large fraction of our reserves of that fossil fuel as well. So for the bulk of our base-load generating capability, it appears that nuclear power is a requirement even if our growth rate is slowed down and only modest growth rates are maintained.

Nuclear power plants, any more than any other kind of industrial plant or for that matter a shopping center, can't be built without having some environmental impact. Nuclear plants, if they're located properly, designed properly and operated correctly, can have an essentially insignificant impact in comparison to the benefits derived from the electric energy they produce and to the alternative means of generation that are available and these may not be very many in the not too distant future. However, it is important that we do not sit back and let Congress try to rewrite the first, second, and third laws of thermodynamics and watch while some people in Washington attempt to implement that legislation.

WPI

It's important that we don't sit back and let Congress try to rewrite the first, second, and third laws of thermodynamics — and then watch while some people in Washington attempt to implement that legislation!

Nuclear Reactors — safe or not?

by Dr. Norman C. Rasmussen

What kinds of accidents could happen to a nuclear power reactor? And just what is the likelihood of any of these actually happening? For an involved engineer's judgment, consider this . . .

Dr. Norman C. Rasmussen is professor of nuclear engineering at Massachusetts Institute of Technology and director of the M.I.T. summer course in nuclear reactor safety.

A graduate of Gettysburg College, Dr. Rasmussen recieved his PhD in physics from M.I.T. in 1956.

He serves as a consultant to government and industry, including the AEC, the Nuclear Energy Property Insurance Association, Brookhaven National Laboratory Safety Review Committee, and the New York State Atomic and Space Development Authority. He recently headed up a one-year study for the AEC evaluating the overall risks from reactor accidents.

THE FIRST THING to understand about nuclear reactor safety is what the risk is. The risk is simply the release of the radioactive content of the core. That's about the only risk that anybody conjures up as being a public danger and it's the only one I'm aware of. One thing a reactor is not is a potential nuclear explosive. It is physically impossible for today's reactors to detonate like a nuclear weapon, for good principles of nuclear reactor physics. Everybody who's studied the matter agrees on this. So the thing we worry about is that, in the course of operation of this plant, we accumulate in the core some 10^{10} curies of radioactive fission products. This is about the equivalent of 10,000 tons of radium; it's a lot of radioactivity. We are therefore obligated as nuclear engineers to give a high degree of confidence that this amount of radioactivity or any significant fraction of it won't be released to the environment where it could cause serious harm to the public. There's no question that if you release a sizeable fraction of the activity in the core, you'd have a very serious accident. I personally don't believe it would be the same order of magnitude and dimensions that the nuclear reactor critics claim it would be. They overestimate the effects of such an accident by an order of magnitude or more, but nonetheless it's a bad accident; we should avoid it and make its possibility of occurrence very low.

The radioactivity in the core of the reactor is bound up in the fuel itself, which is uranium dioxide, a ceramic-like material that melts at about 5000°F. And in fact to release this radioactivity in any substantial quantity requires the melting of that uranium dioxide. So the problem of protecting the public from serious accidents reduces to one of assuring ourselves that the core won't melt. Certainly there are lesser releases that

we also want to protect against, but the very serious accident that our critics worry most about is an accident that can come about only if we melt a sizeable fraction of uranium dioxide core, and that means raise it to about 5000°F. At first glance that's not such a difficult problem, but it turns out that, although its a relatively easy matter to assure ourselves that the chain reaction is shut off (and the surest way we have if all else fails is to boil the water away because after the water has boiled away the chain reaction can no longer proceed), nonetheless this 10^{10} curies of radioactivity generates heat at a very significant rate. Right after the reactor shuts down it's about 5 percent of the core power. Now 5 percent may not seem like much but a large power station is 3,000 megawatts and 5 percent of that is 150 megawatts. In 1950 the largest power generating station in New England was 150 megawatts, and that's the decay heat you're left with in a large power station when it is first shut down. This heat rate gradually decays as the radioactivity dies away, but nonetheless it presents a heat source sufficient enough under adiabatic, or non-cooled, conditions to melt the core. And so we must be assured that we continue to maintain cooling of that core even after the reactor shuts down.

The principal accident that has been the controversy over the last two years, which is a design basis accident for the power plant, is the loss of the coolant water from the primary cooling system. You recall that in a reactor you have a series of pumps which pump water through the core, remove the heat, the water comes out either in the form of steam or hot water that's used to generate steam to turn the turbine, the condenser condenses that water, and it gets pumped back through the cycle again. Now if the primary system, which in a reactor typically operates at a pressure of 1000 to 2000 psi and at temperatures of about 600°F, if it ruptures or breaks, it's clear that the water inside will rapidly flash to steam and blow out the hole and we'll be quickly left with a dry or essentially dry system. That is, you'll have lost enough water that you can no longer circulate it and cool the plant. This is a recognized problem that's dealt with by the addition of what we call the emergency core cooling system in the reactor. The sole function of that system, which never operates under normal conditions, is to be there to deliver extra water to flood the core in case the primary system itself loses the water that normally cools the core. And for two years there's been a legal proceeding in Washington arguing the pros and cons of the method we use to calculate the emergency core cooling effectiveness.

As a result of those two years of hearings, in December 1973 the AEC issued a set of criteria which shall be used by all utilities (and that means the vendors that supply them must show the utility and the utilities show the AEC that their plants meet those criteria) which assure that the fuel does not exceed 2200°F as a result of a loss of cooling accident. Now 2200°F is well below the point we think the fuel gets into trouble. The melting point of the cladding is about 3300°F, but it goes under severe oxidation reactions in a steam atmosphere and begins to deteriorate at temperatures at the 2700 or 2800° range. So the AEC feels its safe if you can guarantee that you don't exceed 2200°. But to further guarantee that you don't exceed 2200° they specify how you must calculate what temperature you achieve as a result of this accident. And that calculation includes, as you might guess, a large number of conservatisms because the blow down of this large primary system steam into the containment is a rather dramatic and complicated accident whose details, even with today's largest computer, can't be calculated with the precision that we might desire. Nonetheless we use what all engineers use and that is conservative values for the various quantities needed in the calculation to calculate an outer bound of what's the worst that could be. And that's exactly what the AEC requires. They make you assume a whole variety of pessimistic assumptions in your calculations to assure yourself that the 2200° you calculate is in fact the worst possible temperature it could achieve and not what you anticipate it might. In fact, people who calculate it on their best engineering judgment calculate that the temperature achieved in these accidents is between 1200-1400°. In such accidents, the good engineering estimate is that we would expect that you would get 1200 to 1400° in the worst kinds of accidents; the fuel gets in trouble at 2800°, and so the margin of safety is some 1400° – nothing happens to the fuel. However, the outside limit we think we could ever get, if all our best engineering judgment is wrong in the most pessimistic way, is that it might be as high as 2200° and we still have about 300 to 400° margin to safety. So that issue has been argued and I don't know if it has been put to bed because the interveners have the right to take this to the courts now if they're not satisfied with the AEC's judgment. There's no indication yet that they intend to do so. Rather I think they'll find that there are other points to argue about that may be more fruitful to them, that is where the research work isn't as detailed and the amount of hard information isn't as complete. And so they raise a number of other issues that I thought would be worthwhile to outline here.

One in the forefront today is the failure of the pressure vessel itself, of the plant. In a large modern nuclear power station, the pressure vessel is a steel vessel. It's typically between 10 and 15 feet in diameter and between 30 and 60 feet high and it must contain the primary water at pressures between 1000-2000 psi. It is felt that the failure of that vessel is so unlikely that there are no systems in the reactor to defend against its failure. And should it fail in a catastrophic way, there's little question but what the core would be uncoolable and it would melt by virtue of its fission product heat. And the argument today is, how confident are we that pressure vessels won't fail by some of the mechanisms by which steels have been known to fail? Probably the best compiled document for the case of the probability of pressure vessel failure has been recently released by the Advisory Committee on Reactor Safeguards. This a committee of fifteen eminent scientists who review all reactors and reactor projects and report to the AEC their findings relative to their safety, at least in regard to their safety as far as public risk is concerned. And this body of people has issued a generic report of their consideration of the pressure vessel failure argument and what they find. They have compiled from various sources throughout the United States and the world the statistics on the behavior of pressure vessels in other kinds of service.

In 1950, the largest electric power generating station in New England was 150 megawatts; that represents the decay heat you're left with when you first shut down a large nuclear reactor.

In the nuclear business we have barely a few thousand vessels years of history on which to base our statistics so that's not enough to convince ourselves that the failure probability is one in a million or one in ten million or some number that we'd be happy with. The American Boiler Manufacturers Association has worked in recent years compiling all the information known about the performance of boilers in the United States. They've specifically limited their investigation to boilers in use in commercial electric generating stations. These are typically boilers manufactured since 1939, either under ASME Section 1 or Section 8, two codes that have been commonly used to specify the way the vessel should be manufactured, operated and serviced, inspected and so on. Their accumulated records show 723,000 vessel years of service and no catastrophic failures of those vessels. By catastrophic I mean a failure big enough so that had it occurred in a nuclear vessel, it would have denied us the use of the emergency core cooling system to recover from the accident. They have found some ten or twenty "potentially disruptive" failures. These were small failures, cracks, leaks and so on, which if left unattended and allowed to propagate through thermal cycling or other means, could have lead to a larger break in the vessel. All of these cases were detected and repaired in time and the vessels put back into service. Many of them were characteristic cracks around small penetrations in the vessel which of course don't exist in nuclear vessels by and large. They also reviewed the data of the British, which have about 100,000 years of vessel service, and some data the Germans have gotten together on a much broader class fo vessels, down to a very small vessels for a variety of applications other than power plants, a total accumulated experience there of about 1.7 million vessel years of service. The combination of all this data in which there are no disruptive accidents in vessels similar to the kind used in nuclear service, that is large vessels in power plants, but a few have been noted in smaller services. At any rate, as a result of statistical analysis of all this data, they conclude that in non-nuclear service, the history of statistical data from these three sources – Germany, Britain and the U.S. – provides ample reason to believe with 99 percent confidence that the failure rate of such vessels is less than 1 in 100,000 per vessel per year. They further reviewed the techniques used to fabricate nuclear vessels, which are much stricter. They are what we call Section 3 of the ASME code. They are much stricter in terms of the class of materials that are qualified for such service, in terms of the fabrication techniques, in terms of the quality assurance procedures, in terms of the in-service conditions that are allowed – they may be cycled thermally fewer times, they must be inspected more often, and the code also specifies what kinds of inspection should be used. In considering all these factors that would lead one to believe that nuclear vessels in fact may be even safer than the other vessels on which the 10^5 number were based, the ACR concluded that one could conservatively assume a factor of about 10 better for nuclear vessels. They feel that it may even be better than that, but they're quite confident that it's a factor of 10 better. So what they finally concluded was that the failure rate of nuclear vessels, with 99 percent confidence, was less than 10^6 or 1 in 1,000,000 per vessel per year. Now the question remains, is that a low enough probability to satisfy people? We as engineers can suggest what's reasonable probability, but really society must decide and it won't decide blind. You've got to point out to them what are the risks they take and so on. But the AEC has suggested through its regulatory division that a failure rate of less than 10^6 per plant per year of a kind worse than the plant is designed to handle, that's for these very serious accidents, would be an acceptable design goal.

It is physically impossible for today's reactors to detonate like a nuclear weapon, for good principles of nuclear reactor physics.

There are several other issues that keep coming up, not having to do with the equipment or the plant itself. One particular one that keeps surfacing is the safeguarding of nuclear materials. The threat that some demented or otherwise erratic person will try and steal in some way enough materials to fabricate a crude explosive, thereby blackmail or somehow threaten society, is a real threat that we shouldn't pass by lightly. We should defend as best we can the fuel cycle from such attempts at diversion. Fortunately, in the commercial reactor fuel cycle we operate with lightly enriched uranium, less than 5 percent U^{235}. This material as it stands is not at all suitable for the manufacture of a nuclear explosive – in fact, it's impossible to do with that kind of material. The only place in the commercial fuel cycle where one runs across something that could be fabricated into an explosive is in the plutonium that's produced in the fue during operations and extracted from the fuel at the reprocessing plant. This material although not what the military people would call weapons grade, is in fact a material that a crude device could be made from Our most outspoken opponents argue that because of this threat we should cease and desist with the nuclear power program in this country. I think my basic argument to that is as follows. If we stopped all nuclear power plants in this country, there is no question that there would be some reduction in the potential risks of threats of this kind. However, the most desirable things to divert from such a person are not cans of plutonium dioxide from a reprocessing plant but completed weapons from the military or parts of completed weapons from the production that goes into making the military devices. And so by far the biggest threa from this source comes not from the nuclear power industry at all but from this nation's and at least four other nations' programs to manufacture nuclear explosives for the purposes of national security and in a few cases for purposes of civilian applications. And so what we would do is give up all the benefits that nuclear power offers for a very small reduction in the total risk of threats of this

We could pack up our nuclear wastes in a rocket and fire it off to the sun — but we want to make sure that if the rocket falls back to earth the waste capsule won't deteriorate or break open. And looking at the matter as an engineer, if we can make it that good, why not put the material in the can, set it somewhere on earth, and forget about it?

kind, which seems to me not a sensible or rational policy for society to follow.

There are other things that our critics worry about. One of the most commonly spoken of is the waste from nuclear plants. Nuclear plants in the 1,000 megawatt size produce about 1 ton of very highly radioactive waste a year. It is a very nasty material that must be handled carefully and must be sealed in such a way that it doesn't get into the biosphere where it'll get in our food cycle. The worst part of this material has a half-life of twenty or thirty years but there are trace elements with half-lives of thousands of years in this material. Our critics argue that we leave, through the generation of power by nuclear means, a legacy to unborn generations that we have no right to leave. There is no question that we leave something that will be around for a long time. I think though that there are ways that we can deal with it safely and protect it in such a way that it won't get into the biosphere.

Let me point out that one ton of material produced in the generation of about $100 million worth of electricity is not a very big problem, because you can take a rather large amount of dollars per ton, without ever noticing it, off the top of that $100 million worth of electricity that this 1,000 megawatt plant generates each year. And so we can afford an enormous amount of money without ever affecting the cost of electricity to assure ourselves that this material doesn't get free in the environment and affect future generations. Now the current policy of the Atomic Energy Commission is that this material be converted into a glassy like substance that's insoluble in water and normal environments that you encounter, and encapsulate it and store it in what's called interim storage, whose length of storage is felt to be 20-50 years, while we decide on which of these technologies we want to use to dispose of it in its ultimate way. There are at least three techniques currently under investigation, any one of which looks like it has the capability of ultimately getting rid of this material. One is burying it in deep layers of salt underneath the country. The country is underlain with salt about one-third of the area in depths of 1,000 to a few thousand feet, in seams from a few hundred to a few thousand feet thick, and it provides a very good place to store something permanently for several reasons. One is the fact that the salt has been there for geological times means that there are not underground water streams or the salt would have dissolved and been washed away. So there's no problem of underground waters in bedded salt. Earthquakes, which might tend to crack and cause faults in other kinds of geological formations, crack and cause faults in salt, but it's a plastic material that reseals and it makes a sealed containment around your radioactivity even if temporary cracks develop. And finally salt is a good ion exchange medium so that any radioactivity gets loose immediately gets trapped on the salt and still doesn't move anywhere into the environment. So for all these reasons it seems to be the most desirable method.

There are other methods, including such things as firing the wastes off into the sun. It's within the realm of our technological capability now and even at today's prices wouldn't make electricity prohibitive from this source. There are however some safety problems involved with that because we'd want to assure ourselves that should our rocket fail, the capsule won't deteriorate when re-entering the atmosphere and coming back to earth. And as an engineer when I look at it, if you make the capsule good enough to survive all that, why not just can it and set it somewhere on the earth and forget about it. And there are other kinds of geological disposal. There are places where the earth's crust is going down toward the core and its been suggested that the radioactivity be buried in these places and in geological time it'll move into the earth's core and be gone as far as getting into the biosphere is concerned. So all these things seem to be reasonable ultimate disposals. None of them have been developed to the point of being put into full-scale operation and a temporary storage scheme is the one currently being used.

I would point out that any other way we generate electricity leaves a legacy to our unborn generations, whether it be the millions of tons of CO_2 we put into the atmosphere that could change the earth's climate, whether it be the depletion of our fossil fuels or the creation of enormous ash piles from the burning coal – any one of these is a serious deprivation of future generations if they desire to use these resources too, and I think we all realize that. So a lot of the things we do leave a legacy to unborn generations and I hate to see the argument used just against nuclear. I thing we ought to be careful about everything we use.

That reviews some of the key arguments that the critics raise against us. They continually argue about the reliability of these plants. Our reliability record has not been outstanding with nuclear plants. In the last ten years their availability for the generation of power has been about at the rate of 68 percent of the available time had they actually been able to generate and deliver electricity. About 10 percent of the rest of the time would have been consumed by normal expected shut downs for repair, maintenance, and refueling, and the other 20 percent or so has been because of unexpected failures in plant equipment that required the plant to be shut down for unpredicted repair. About half of this shut down time was due to the non-nuclear parts of the system and about half was due to the nuclear parts of the system. I don't think that's an outstanding record. About the only thing I can say in its defense is that its exactly the same record that large fossil fuel plants put into service and operated over the last ten years also exhibited. I think both can be improved.

I think our critics have a point when they say unreliability is in their minds unsafety. Well, I think reliability is related to safety because certainly unexpected events all have the potential of creating a safety problem. Our record's been outstanding. The things that have gone wrong, even in vital systems when they've happened have not come close to compromising the plant or getting it into any condition close to melting the fuel. And for that we should thank the engineers who put in a great amount of redundancy and the regulatory agencies who require it to defend against all kinds of unexpected break downs and failures of the system. There's never been a major release from a nuclear plant.

I don't think nuclear plants have had an outstanding record of reliability. But it's exactly the same record as fossil fuel plants put into service during the last ten years.

There has never been a claim against a nuclear plant by a third party for injury to them by virtue of nuclear incidents in the plant. That's an outstanding record which I think we'll only continue to achieve if we're diligent and pay attention to safety details. I'd surely like to see us get the reliability of the plants higher. I think that's achievable, and the pay-off is enormous. Any utiltiy which can get 10 percent extra out of its plant gets about 1,000 extra hours of operation a year, and this comes to several million dollars, worth of electricity extra a year, and the pay-off is really real. I don't think in general the utilities have devoted enough effort to this problem but the Electric Power Research Institute is committing substantial funds to reliability studies and I think this will improve rapidly.

The basic argument between the nuclear power proponents and the critics centers around this: there are risks from the operation of the nuclear plant, risks of rather serious and bad accidents. The critics say the risk is much too high; the proponents say

Any way we generate electricity leaves a legacy to our unborn generation, whether it be CO_2 in the air that could change the climate, whether it be the depletion of fossil fuels or the creation of enormous ash piles, whether it be buried atomic waste products.

the risk is very small and acceptable; and that's really the battleground that we're fighting in. It's very hard to prove that you're safe as 1 in a million per year because there are no statistics to prove it so its a very fruitful ground for them to press their argument. And so in looking at this you must always ask yourself, well if there's a risk, and there is, what are the consequences of not going with nuclear power? We now propose to have in operation in this country about one hundred 1,000 megawatt electric generating stations from nuclear power within six or seven years, by the early 1980s. And I ask myself, What alternative would we have? Well, in today's world climate the only alternative we have here in the United States, I would argue, is coal. The potential for buying enough oil I feel is out of the question. The price is out of the question. We have substantial amounts of coal and we can generate the power that way and I'll gladly argue with anyone that there's not other technology available, now or otherwise, that could be brought on line in this quantity and this size by 1983. So let me ask then, what is the difference to society between operating 100 coal stations at the 1,000 megawatt level or 100 nuclear stations?

What I'm going to talk about is the annual effect of one hundred 1,000 megawatt electric power plants. Now, a 1,000 megawatt power station is an enormous piece of equipment that generates enormous amounts of energy. Just to put it in perspective, a 1,000 megawatt coal plant consumes coal at the rate of 10,000 tons a day. That is, a 100-car freight train load is pulled up to the plant and dumped every day. In fact it consumes coal so fast that they can no longer dump coal cars by opening that little hatch at the bottom. They actually pick them up and turn them over to dump the coal out. Otherwise it takes too long to get the coal into the bin. A plant this size uses 3 million tons of coal a year. If it were an oil plant it would burn about 12 million barrels of oil a year, and that's enough to heat 250,000 homes in the city of Worcester for that same year. It's just enormous magnitudes we're talking about that few people perceive or realize who haven't really gotten close to these plants and thought about it.

Now let's ask ourself what's the health effect? The best article I know that discusses these effects is one by Lave and Freeburg which appeared in a recent issue of *Nuclear Safety* and I recommend it to you. They've come to the conclusion that if you compare the effects of health of air pollution from coal plants versus the effects on health of low levels of radioactivity emitted from nuclear plants, the coal plants are 24 to 18,000 times a bigger health hazard so let me just call that worse. 24 comes from the old boiling water reactors which released a significant amount of short-lived radioactivity from their air ejectors on their condensers, and 18,000 is the best new pressurized water reactor which has very low emissions. And new boiling water reactors are at least 50 times better than this, so for new plants it's about 1,000-18,000 depending on the variety of plant you use. What about the health effects on the workers? This is to the general public. In mining that coal we would expect from coal mine statistics to have between 300 and 400 miners killed. (This actually is the number for the whole fuel cycle but most of the accidental deaths occur in the mines so we'll put it down there.) 300 represents the surface mining, 400 the underground mining. In nuclear operations, about 15 to 22. Again remember, this is for 100 plants, the coal needed for 100 plants. The long-term health effects, which include such things as black lung, about 18 times worse in the coal mining industry than the effects of lung cancer and other diseases which sometimes appear in uranium miners. Just to give you an idea of these chronic effects in the coal mine industry in the United States, in 1972 the U.S. government paid out $554 million in claims for black lung disability – a half a *billion* dollars in health claims just from the coal industry alone. It's a substantial item. We hope it'll get better with new mining regulations, but we just don't have statistics enough to know how much impact that'll have. Presumably it'll be better. Presumably the nuclear part will be better with the new health effects there too. Bear in mind that each miner can mine so much more fuel (in terms of the megawatts it produces) in uranium that there are substantially fewer miners needed, and that's basically the reason that the numbers are so different.

How about air pollution? In air pollution, there are about 20 million tons of particulates released per year from these hundred coal plants. There are about 10 million tons of SO_2. There are about 100,000 tons of carbon monoxide. And there are about 2 million tons of NOx. The nuclear plant, of course, has none. No chemical pollutants are emitted from a nuclear plant, no chemical air pollutants other than the diesel generator which is tested regularly.

Now, waste. From a fossil fuel plant with uncontrolled burning, so that most of the stuff is in this particulate number, there are still about 5 million tons of ashes. And the nuclear is 1 ton of waste per plant, that's 100 tons of highly radioactive waste.

Environmental effects. It requires, if we strip mine, the tearing up of 140,000 acres to get the coal and it requires 1600 acres if we strip mine the uranium – substantial difference in the amount of environmental impact from the mining.

Finally the economics. At today's price structure, nuclear plants have somewhere between 0.5 and 1¢ advantage in the price per electricity per kilowatt hour. Let me point out to you that today's nuclear plants generally can achieve electrical production at the cost of about 1.2 to 1.5¢ per kilowatt hour. Oil at the cost of $6 a barrel is a fuel cost of 1¢ per kilowatt hour, to which we have to add the capital costs and operating costs of the plant, which put oil between 2 and 3¢ a kilowatt hour (and oil today is closer to $10 a barrel.) Coal is somewhat lower than that, probably around 1.9 to 2¢; it depends how close you are to the mine. So with domestic coal there's 0.5¢ difference. With oil the nuclear advantage is more like 1¢. What does that mean? We have 100 plants. Let's assume they operate for 6,000 hours a year. That gives the annual savings

A 1,000 megawatt coal plant consumes 10,000 tons of coal a day – a 100-car freight train – so fast that they can no longer dump coal cars by opening the hatch in the bottom. They pick them up and turn them over.

To calculate the worst-case accident involving a commercial airliner, we would have to assume it crashed into the Rose Bowl during the afternoon of New Year's Day; thousands of people would be killed. But the risk of that happening is very small. And the risk of nuclear accidents is in the same range as that.

to society of somewhere between $3 and $6 billion. That's not a small amount of money to be sneezed at. We've always felt in this country, particularly during the 50's and 60's, that we had all the capital we wanted to do anything we wanted. We're fast becoming a capital-short rather than a capital-rich country, as the interest rates show us. I would submit that to be able to save society $3 to 6 billion for some other activity is a worthwhile thing to try and achieve.

Against all these advantages for nuclear power we must weigh the chance that they can cause an accident much more severe than a coal plant accident of any kind we can imagine. And we have to decide for ourselves what probability we're willing to accept for such a severe accident. We have been working for two years in Washington to try and define what this risk is, both its probability and its consequences. The results aren't out yet, but basically we find no alarmingly high probability. I think its fair for you to assume that means some number like 1 in 1,000,000 or less is probably in the range that our results might come out. What we also find is that the most likely consequence of melting the core is a much smaller accident than that perceived by the critics of nuclear power. They get their very bad accident by not only assuming the core melts, they assume it melts in the worst way, the worst thing happens, the worst weather exists, the highest population exists around the plant, and predict rather staggering numbers of fatalities and injuries as a result of this. There is a rather high number if you really dump the whole fission product inventory out into the atmosphere under the very worst conditions, but the probability of such an event is many grders of magnitude down from what you would ordinarily expect to happen.

If I asked you what's the likely consequence of an airplane crash, you'd say 100 or 200 or 300 people killed. But we've done calculations to see what we get if we take this same kind of approach toward airplane crashes, and we find that airplanes can crash and cause between 10,000 and 20,000 deaths. This comes about simply because airplanes fly over places where large groups of people congregate. Specifically, take the Rose Bowl during the Rose Bowl game or any one of our many sports stadiums, race tracks or other public events during the time that the activity is going on. The probability is very small that an airplane will crash into them, but there seems no question that if it crashed into the crowded stands of one of these stadiums, literally thousands of people would be killed. Now I think we all understand that, and we judge that the risk is very small. I think the risks from these nuclear accidents are in the same range as that. And I think they're perfectly acceptable for the benefits we get.

WPI

Drawing by Chas. Addams; © 1974 The New Yorker Magazine, Inc.

Power production and the *public* interest? What's that?

by Myron M. Cherry

So you think the Atomic Energy Commission knows all about nuclear power? Then you probably believe it serves the interest of the general public, too . . .

Myron M. Cherry is an attorney with the Chicago firm of Jenner & Block. He attended the University of Illinois and the Northwestern University Law School, graduating in 1962. Since 1970 he has specialized in environmental litigation, being particularly concerned with the "lack of rational behavior in the construction and operation of nuclear power plants." He has represented citizens' and environmental groups throughout the country in opposing nuclear power plants. He is counsel to Ralph Nader and the Friends of the Earth in a lawsuit seeking to shut down nuclear power reactors throughout the United state and local agencies in connection with state and local angencies in connection with power siting bills, nuclear moratorium bills, and particularly bills dealing with increasing the ability of the public to participate in governmental decisions concerning power production.

I HOPE TO SUGGEST some ways of solving what I choose to call an accountability crisis rather than an energy crises. Participatory decision-making is an accepted theorem of our form of government, business and other institutions. In practice, however, we make decisions in a manner which avoids as much as possible factoring in all of the various interests. More specifically in terms of power production, decision-making has been monopolized by a few and ripped from the grasp of the many. Historically the interests which have made decisions have been the ones to profit handsomely and enormously, and the interests which have gone unrepresented have suffered and been abused. These abuses have run the energy gamut from being subjected to unreliable, dangerous, and unethical ventures such as nuclear fission plants to slick ad campaigns that tells us to brush, wash, cook, and make love electrically, and portray a juvenile he-man philosophy in being able to pop a can of beer, all more expensive and all made at the sacrifice of the many unwary who used to believe that the government and the president don't lie. Even at the so-called professional or academic levels in organizations such as the American Nuclear Society and the Atomic Industrial Forum, the password has been *keep the lid on* and *let's solve the problems ourselves.* This kind of flavor of a lack of professional responsibility is in my judgment evidenced by the failure of the American Nuclear Society to have tackled openly and in a series of public meetings the safety and reliability problems associated with nuclear development and by the dishonest lack of openness that pervades the entire nuclear industry as well as Washington's version of machine politics, the Atomic Energy Commission. Statements of this nature are not made only by those critical of the industry such as myself. Thus the

November 1973 issue of *Power Engineering* magazine said of the nuclear industry's outlook and credibility: "The nuclear community seems to profit little from some pretty plain and important lessons of recent history." And a study of AEC licensing procedings completed in August 1973 under a National Science Foundation grant at George Washington University School of Law concluded that, "despite lip service paid to citizen participation in governmental decision making, agency arrogance, expert elitism, stacked-deck proceedings, and the consigning of citizens to helplessness before the steamroller of big government is the rule rather than the exception." James Madison once wrote, "knowledge will forever govern ignorance, and the people who mean to be their own governors must arm themselves with the power knowledge gives. A popular government without popular information or the means of acquiring it is but the prologue to a farce or a tragedy."

Decision-making in power production has been more than just farce or tragedy. It has been a long-running, worldwide production whose continually renewed objective has been to seek a profit; and demand, when not manipulated, is satisfied only when the price of admission has been paid in advance many times over. Yet merely having the people seek entry into decisions affecting their lifestyles is only part of the solution. The other and necessary part is a sincere invitation from those presently in power. Without desire to participate by the people and a willingness to share in a meaningful way by industry and government, decision-making resembles little more than despotism, a despotism which is benevolent only when it pays. When I speak therefore of public participation, I am talking about a partnership which does not exist today in the power production arena. Let me pose a few examples. When a utility decides to build to expand its facilities, it likely tells reporters, shareholders, and others who listen that it is doing a noble thing, satisfying a public need and demand. That public need and demand is manipulated; it is a forced objective based upon what the utility's large industrial customers want to build or sell and feeds a consumer market most aptly characterized as needed or not. To be sure, we need power. To be sure, however, we encourage wasteful uses of electricity and no one has ever accused utility executives of spending too much time talking to those whose environmental destinies they daily affect. At the regulatory level in the federal agency, the public is similarly treated. Tennessee Valley Authority, the Corps of Engineers, Federal Power Commission, Atomic Energy Commission – all actively avoid facing up to public input or actively try through unfair hearing rules to face it down. And when was the last time that a state public service commission had more on its mind than giving its monopolistic partner, the utility, a fair return on its investment. Critical? Indeed these remarks are critical. Factual? I think they are supported by the record. The point is that we can no longer in our society permit any group, no matter what its interest, to spend time in a room of mirrors facing only approval from its peers and avoiding the shake and jar of contrary opinion and the enlightened insight that perhaps prior practices were in error. We can no longer avoid the luxury of a Chet Hallowfield who scorns nuclear critics for wanting to prove the civilian nuclear power program wrong all these years rather than inviting them into the safety hearings which the joint committee has promised for more than three years. Before we examine in some detail the present status of the public participation partnership and how we might institute changes to ameliorate it, I think it useful to see what changes an enlightened public opinion can force even under the present system of unfairness. In my judgment, the present examination worldwide of our energy problems was brought into focus by a series of public interest victories which exposed the profit-demand syndrome which has afflicted power production decision-making. The Arab oil embargo was perhaps the excuse for examining the energy industry and the values it both serves and neglects. It was not, however, the reason.

Back in 1970 when the National Environmental Policy Act had not yet emerged as the instrument of social and economic change it is today, energy interests were not subjected to critical examination. The oil interest had succeeded in playing both sides of the fence, urging an oil import quota when they wished to expand to abroad and seeking changes in our import program when domestic capacity was at full tilt. Nuclear power plants were being purchased at an alarmingly fast pace without any examination of their potential legacy, or for that matter any concern that safety problems of the 1960s which, rather than being resolved, were added to with more problems of increasing severity and complexity. And energy conservation – that can be answered by simply referring to the large illuminated sign that Commonwealth Edison had in full view of all those traveling into Boston from Logan Airport. It said simply, *Electricity Is Your Best Buy.*

So in 1970, when the so-called public interest movement began on its way, people clamored for answers. Citizens' groups, distressed by the quality of response, secured lawyers, economists, engineers, and students and began the battle. It began with thermal pollution, the heating of large masses of water from the waste heat of nuclear power plants. It then exposed the poor workmanship of construction and operation of nuclear power plants and forced the AEC to focus on a problem perhaps emerging as the Achilles heel of the nuclear civilian power program – unreliability and poor quality control and quality assurance. No less than American Electric Power Corporation and Consolidated Edison of New York have said *no* to nuclear, rejecting future plants with an unsatisfying and bitter reaction to their experience. These experiences are presently growing with large nuclear mistakes spreading through the country. Indian Point I and II, Pilgrim, Vermont Yankee, Palisades, Midland – not battles in some revolutionary war but monuments to waste, neglect and wrong thinking. And many others facings so many problems that the *Wall Street Journal* investigated and then quipped that nuclear plants were atomic lemons whose unreliability was their most dependable feature. Right now in New England you have five nuclear power plants, four of which are not operating. And it's the same throughout the United States.

As nuclear critics became more educated and as the industry's lack of honest information became apparent in the frenzied propaganda that brownouts were in store, safety became the focus of the controversy. Along with the failures of emergency core cooling testing at Aerojet Nuclear came the Union of Concerned Scientists and scores of local and national citizen groups, exposing the soft underbelly of nuclear power – the lack of safety regulations. As 1971 emerged into 1972 and '73, public exposure brought us emergency core cooling systems whose reliability is guesswork, steam generator tubes that leak, nuclear fuel that densifies, valves important to safety whose pedigrees were unknown, structural mistakes which cost millions to repair and operation error and just plain stupidity, such that an AEC report recently concluded that the absence of death or serious injury was largely "the result of good luck." Most recently, through

For as long as one can remember, policy in connection with power production has been made and maintained by those in control of the sources and distribution of power production.

the courtesy of Mr. Dye of the *Los Angeles Times* and not the reporting industry of the ANS or the AEC, we have been treated to radioactive leaks at storage facilities so pervasive and so serious that an entire river basin's drinking water is threatened and the AEC is concerned about a critical mass forming, not in a nuclear weapon but in a radioactive waste storage facility at Hanford, Washington. The exposure of faults in the power production arena have not been limited to nuclear. Thus we have seen offshore drilling that violates first principles of environmental protection, a wavering U.S. oil production capacity geared solely to profit, the Alaskan pipeline controversy that exposed not only environmental degradation but also the monopolistic evils of integrated oil companies smothering independent competition, and the fact that price structures governing the distribution of electricity favor the high user, forcing the poor once-again-unrepresented public to in effect subsidize the damage done to its independence and environment.

Now before you think that my litany of horrors in power production is an end in itself, let me tell you that each and every one of these matters was brought to light by public prodding and by the desire of the public to execute its half of the public participation partnership. Each and every one of these matters was fought by industry and government, sometimes in openly dishonest ways, thus violating completely its half of the partnership. Public participation in a meaningful way is not the result of organized society. It is rather a crucial precondition to the maintenance of organized society.

Now that we have in mind perhaps the philosophy of public participation, and have set out some of its achievements despite the opposition and lack of accountability of those in power, its time to focus on the present system and offer some suggestions for change. Ernest Gellhorn, a professor of law at the University of Virginia and a long-time student of public participation in administrative decision-making, recently wrote in a law journal on this subject. He said, "there are a number of potential social advantages to public participation in administrative hearings. Public intervention can provide agencies with another dimension useful in assuring responsive and reasonable decisions. It can serve as a safety valve, allowing interested persons and groups to express their views before policies are announced and implemented. It can ease the enforcement of administrative programs relying upon public cooperation. And it can satisfy judicial demands that agencies observe the highest procedural safeguards." Professor Gellhorn then concluded that if agency hearings were to become readily available to public participation, confidence in the performance of government institutions and in the fairness of administrative hearings might be measurably enhanced.

A survey of the types of public participation presently permitted by the administrative agencies which regulate power reveals the following: there are six major administrative agencies which have a significant voice in power production. These are the Tennessee Valley Authority, the Corps of Engineers, the Federal Power Commission, the Atomic Energy Commission, and the Departments of Interior and Commerce. The first four are concerned primarily with regulating the power itself while the last two, Commerce and Interior, have jurisdiction over various forms of our natural energy resources. Generally speaking, no form of active, trial-type public participation is permitted in four of these agencies and while two of them, the FPC and AEC, have authority to hold public hearings, they have rules so strict that it's very difficult if not impossible to explore fairly power production issues before them. No agency actively solicits public participation from public interest groups as a matter of routine and no agency provides funds to pay costs and expenses of public participation. The most general type of permissible public interest input is gathered in the so-called "notice and comment hearing," where groups can submit written comments to an agency. This type of proceeding, while perhaps satisfactory for broad future policy decisions, is inapposite and even unfair in most situtations. A public interest group in notice and comment hearings has no opportunity to see other views submitted and has no opportunity to question or cross-examine the agency's viewpoint. Thus this type of proceeding permits an agency to advertise that it receives public interest type comments without however actively promoting and soliciting that comment under fair procedures. Moreover, even if such informal procedures were satisfactory to solicit the views of public interest groups, agencies rarely give adequate notice of their deliverations so that all interested persons and groups even know that a hearing is to take place. Rarely are agency proceedings noticed in anything except the *Federal Register,* a daily compilation of agency action which is quite expensive and not readily available to local citizen groups.

I hesitate to leave this portion of my remarks without a word about Atomic Energy Commission procedure, a procedure with which I have had more than passing acquaintance. I have been involved with the AEC's regulatory adjudicatory process for more than three years and in connection with more than ten contested interventions and three generic-type national rule-making hearings involving the emergency core cooling system, the nuclear fuel cycle, and the transportation of radioactive waste. Briefly, the AEC's procedures can be outlined as follows. A utility files an application explaining as little as it can get away with and dubbing whatever it does reveal of substance as proprietary. No notice of filing is given anyone, and a person or group who is interested in utilities application is usually not aware of the filing and may not usually get a copy of the application. The application is then the subject of periodic review by the AEC regulatory staff and the Advisory Committee on Reactor Safeguards. Many meetings are held with the utility and vendor and most all meetings go unrecorded in any formal fashion. Letters between and among the utility, vendor, AEC and ACRS are conveniently placed in a Washington, D.C., document room, hardly providing notice or information to citizens outside that area. This procedure continues for about two years until the negotiating procedure is resolved in a deal. The regulatory staff has accepted the utility's promise that all will be worked out during construction, and an appropriate research program has been appropriately implemented. Thus the director of regulation at the end of this two-year back-room review agrees to issue a construction permit or operating license. If the director of regulation is not so disposed, then the back-door negotiations continue until he is. Also at the end of this negotiation period, the Advisory Committee on Reactor Safeguards issues its usual letter saying that all is well provided the utility keeps the various promises it has made and continues generally to consider problem-solving and advise the ACRS. Ironically and as a mark of the ACRS's lack of responsibility and credibility, it is interesting to note that since 1965 the ACRS has been issuing such conditional letters about emergency core cooling system resolution but never has answered the quite simple question of why it hasn't recommended suspension or revocation of permits or licenses

Power production has proceeded with only two objectives in mind — profit and comfort — with no long-range plan except to nourish and prod an insatiable demand.

issued upon condition of the fulfillment of a promise which has never been fulfilled. I am speaking about the promise, to resolve the ECCS problem, extracted from but not fulfilled by every utility since the Indian Point II construction letter in 1965. At the end of the negotiating period, having advised the utility that intends to issue a permit or a license, the AEC finally decides to issue a notice of public hearing, soliciting intervention by persons whose interest might be affected.

This point, however, is when an interested party *first* begins his analysis of what he wishes to raise in his petition to intervene. He has thirty days to file a petition and it must be supported by an affadavit which attempts to justify his position from a scientific standpoint. Thus the public interest group, not having access to any information, unless it travels to Washington to see it, is expected to analyze and justify intervention of an application which has undergone two years of review by the AEC and do it in shortly under thirty days. The process of catch-22 unfairness continues. AEC rules provide that a petition to intervene or part of it is to be denied if it isn't set forth in very specific terms, but they won't give you access to information necessary to be specific unless the information is relevant to an already made specific contention. Let me restate this. A public interest intervener is not entitled to discovery of information unless he has stated a specific position related to the information, and since he doesn't have the information to therefore make a specific showing, he fails. And what happens? You have a lot of petitions intervened that run the gamut from complaining about celery to the sun, but that's the fault of information not being available and people being forced into those kinds of options. It's a fine way to run public hearings if you don't want public hearings.

If an intervener manages to get by this hurdle by using or relying upon information relating to similar power plants, he is met at the hearing by the following additional obstacles: (1) a three-man licensing board paid by the AEC and well-schooled in the art of bias; (2) claims by utilities and vendors that access to information is secret and proprietary and may not be seen unless you sign an agreement which prohibits you from disclosing the information to the experts on whom you may have to rely for your case; (3) a claim by the Atomic Energy Commission that regulatory staff and outside consultant reports on the safety of the reactor are unavailable because the government needs to protect its sources to discharge its obligation (note carefully, *secrecy* is a justification for protecting the public health and safety); (4) a claim of urgency by everyone to hurry up the hearing because electricity is needed. The agency and utility are prepared to go forward – they've had two years, and they've made their deal.

No one has ever accused utility executives of spending too much time talking to those whose environmental destinies they daily affect.

I'd like to make the following comments about AEC procedures. The Atomic Energy Commission is insular and tries to actively promote and protect the utility at a hearing. This insular unfairness is caused by the dual functions of the Atomic Energy Commission, which is obligated both to promote and to regulate nuclear power at the same time, as well as by the normal occupational zeal of an institution which has no other mandate but to nuclearize America. The AEC is dishonest and is not susceptible to openness and change. The AEC is afraid to face issues squarely and has adopted a protectionist policy to preserve its own bureaucratic interest. As examples, look how long it takes the AEC to publicly acknowledge accidents in violation of its own regulation. And it's a matter of public record that the Atomic Energy Commission has *never* turned down a utility after a hearing, despite safety problems remaining unresolved and promises unfulfilled, and has never revoked a permit or a license despite the fact that a recent AEC study disclosed that in the last two years there have been more than 800 reported violations of AEC regulations and technical specifications by the utilities around the United States. Finally, the hearing board selected by the Atomic Energy Commission to preside is, in addition to being biased, largely composed of administrative hacks and hangers-on who have little feel for or interest in a judicial system.

In my judgment the AEC today is worse than it was under Glenn Seaborg from the standpoint of open information and protection of all various forms of interest. I fear that in order to accomplish the necessary change, the Atomic Energy Commission must disappear and come back, if at all, in a totally restructured and different way. My analysis of the need for and lack of public participation in power production has led me to suggest some specific and general proposals about the structuring of the energy industry today. The present system of regulation and creation of power production is in the hands of the wrong people. The system is diffuse and cumbersome and is not susceptible to easy change or accommodation of important and emerging interest. Given the lack of honesty and candor of industry and government, its structure –not its motivation – must be tampered with. Only if we build into a new system a barrier to industry insularity and remove the hurdles to public participation while at the same time encouraging such participation can we begin to resolve the crisis of responsibility and accountability which we now face. I propose an energy commission for regulation of all forms of power production. This Energy Regulation Commission, or ERC, would have no promotional or developmental authority, but it would supplant every existing regulatory agency at the federal level having anything to do with the regulation of power production, including siting, construction, operation, and energy conservation. Its authority would include also the power to order that a specific power plant be built or not be built, that interconnections be made or not be made. It would have authority to reallocate existing distribution of fuels, and it could veto utility expansion, requiring instead energy conservation measures or expanded interconnections with utilities having differing peak periods of loads.

The advantages of this proposal to industry, government and public-interest groups are numerous. **First,** government would finally be able to create, apply, and execute a rational, national, consistent energy policy.

The public has become rightly concerned with the realization that it has been forced into a lifestyle about which it has had no decision-making input.

No more would we have the Federal Power Commission saying as it does now that energy conservation is relevant while the Atomic Energy Commission says it is irrelevant. No more would we have a policy set or unset by numerous divisive interests in government and no more would we have to have a situation where, as we have now, the administration needs several committees just to find out the current state of the chaos.

Second, industry would have a one-stop for its power production problems. If a utility wants to go nuclear but that's wrong, the ERC would have the power to grant alternate authorization for a fossil or other type plant, thus eliminating the possibility of and wastefulness inherent in the utility having to file another application with another agency. And let me suggest, and digress for a moment, that there are many reasons why an ERC might tell a utility not to go nuclear even if all nuclear problems were resolved. It is a question of the balance of mix; it is a question of the adequate use of resources. We are in a position today where we are building nuclear power plants under a short supply of uranium, hoping that we'll get a breeder off the ground when we've just found out that the safety problems in connection with the breeder, are more insurmountable than we have dreamed with light water reactors and the whole economics of the production problem has just gone to pot after the recent economic analysis the AEC did. There are fine and discrete issues which can be drawn about the kinds and types of decisions a utility makes, and they ought to be done by one agency.

Moreover, if the reason a utility has decided not to build a gas facility, for example, is because of a lack of gas to a particular utility's area, the ERC if it ordered a gas facility as the best source of expansion, would have the authority to reallocate available supplies of gas to fuel the new plant.

Finally, if the utility was told it had not made out a case for expansion, the ERC would have the authority to order the institution of energy-saving programs on all levels, including the price structure at which electricity is marketed, or order interconnections to assure the meeting of demand by existing albeit distant supplies. In areas outside of the economics of power production the ERC would rely upon the expertise, for example, of the Internal Revenue Service or the Environmental Protection Agency to assist it in determining, on a case by case basis, what action will best promote our energy policy considering the effects and interests of the incentives or depressants offered by tax and environmental laws.

Third, and perhaps most important, the public interest can be protected. The public interest can be protected structurally because the ERC is not wedded – and expressly should not be permitted to be wedded – to any particular form of energy production. No more Atomic Energy Commission with its built-in insular and biased attitudes, no more unbalanced approaches to energy production; the ERC would be directed by statute to balance and consider the various trade-offs which today are omitted from consideration unless introduced in the process by a public participant. The ERC would hold hearings on every application and provide a system of fair procedures. It would release information in advance and provide assistance to public interest organizations. Since the ERC would not be wedded to a single power source, many of the due process problems now apparent in, for example, the Atomic Energy Commission would be eliminated. Furthermore, acknowledging both the past and future contributions which have and can be made by public interest groups, the ERC would be authorized upon proper showing by responsible groups to provide expenses and attorneys' fees to such groups to encourage their role in public participation.

The AEC's Catch-22: A petition is to be denied if it isn't specific, but you can't have access to the information necessary for specificity unless you're specific... It's a fine way to run public hearings if you don't want public hearings.

Contemporaneous with the establishment of an ERC, I also propose that we establish an Energy Development Commission or EDC. This agency would be statutorily separate and apart from the ERC. Its mandate would be to explore and develop alternate sources of power not commercially viable, to investigate better ways to produce power from existing sources, and to analyze existing energy use patterns to devise ways to conserve energy use as well as energy production. The EDC would again not be wedded to any specific power source and would be statutorily obligated to justify its development in any area, each year, and could recommend to its sister agency, the ERC, to halt approval of certain types of power production which have not reached or have lost sufficient maturity so as to be safe, efficient, reliable, and environmentally sound.

With the creation of the ERC and the EDC, I would propose the creation of a third temporary agency which would exist approximately two years. The mandate of this temporary agency would be singlefold: to assist the ERC and EDC in gathering initial information and to eliminate the presently existing scandal of the century concerning the lack of energy-related statistics. Today no agency of the federal government has authority to or is in the process of gathering information on supplies of various forms of energy resources or the state of the art of future forms of energy development. Today if we want to know how much oil and gas there is, we ask the oil and gas industry. And if you want some detail on how information in this industry is manipulated, I commend your reading of a three-part series entitled "Oil, the Created Crises" by Messrs. Donald Bartlett and James Steele of the *Philadelphia Inquirer.*

The lack of information base today is also evident in the nuclear industry. Today, believe it or not, if the AEC wants to know about nuclear safety it must ask the industry it regulates. The AEC for example is often refused information on the grounds of "proprietary." And today, notwithstanding the grave emergency core cooling system crisis in your industry, it has not access to the actual computer codes used by the industry. I might add that the AEC has approved by regulation each of these codes and apparently has had no reluctance to approve that which it has not seen. The temporary agency would end this scandalous nonsense and would order the submission of all types

The Atomic Energy Commission must disappear and come back, if at all, in a totally restructured and different way.

of energy information, including information on reserves. The information gathering agency will have the authority to impose fines and seek jail sentences for corporate executives unwilling to comply. Maybe then we'll find out why the oil industry has failed these past years to use secondary and tertiary recovery methods to extract the 70 to 80 percent of oil it leaves in the ground each time it caps a well.

I realize that my suggestions for a revision of our energy policy and regulating structure may be far off or even impossible because of bureaucratic inertia and the obvious interests of existing agencies to hold and expand their own constituencies. So I wish to conclude by going back to my earlier theme with the knowledge that the present system will breed more and more litigation opting for change. It is clear that the demand for broadened public participation in decision-making, as Professor Gellhorn has observed, rests on the belief that government, like all others, rarely responds to interests not before it. Thus public interest groups will continue to seek entry to the process and a fair government will welcome them, realizing the contribution they can make. Public participation is a right and therefore agencies have a mandate to assist that right, and a failure to offer that assistance amounts to a practical subversion of the right. In the end, agencies and industry would do better to assist and be open because a failure to do so, which unfairly restricts public participation, will only result in court reversals and expensive retrials of hearings and delays in the ultimate resolution of important issues.

As each of you read this, I hope you will be thinking about your own personal obligation to improve the system, to assist the public in its quest for honesty and candor, and have the personal courage to rock the boat and challenge the system when that's necessary. Because of the nuclear safety dilemma, the American Nuclear Society and academicians in the mechanical and nuclear engineering circles have a particularly important obligation which is not currently being executed. Ask yourself, What went wrong? and What can the ANS and its affiliates do to open up the system? Ask yourself, What can I do to make utilities in the nuclear industry more open and honest and responsive to public demands? What can I do to help promote responsibility in the Atomic Energy Commission and other agencies regulating power sources? Ask yourself, if your employer is not honest with the public, Why don't I go in and tell him and if he refuses to change, write somebody a public letter? Ask yourself why you are not objecting to the Atomic Energy Commission's current desire to eliminate and restrict public hearings when it was those public hearings that brought to light significant safety problems. Have you offered your assistance to a public interest group seeking to help expand information knowledge base in connection with a reactor or any environmental problem? Have you told the next guy who says it's all the fault of the environmentalists to shut up? And have you thought, Who ought to go to jail for the mess we're in? If you respond positively to any of these questions, I assure you we'll all be better off. If you respond to all or most of them, unfairness will be past and a real partnership of public participation will be begun.

Each and every one of these matters was brought to light by public prodding, and was fought by industry and government, sometimes in openly dishonest ways.

The data on which these class notes are based had all been received by the Alumni Association before September 1, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI Journal.

1914

ELLWOOD N. HENNESSY was recently honored at a dinner celebrating his 50th anniversary as a life insurance salesman. He is a chartered underwriter with Phoenix Mutual Life Insurance Co., Worcester, and a life member of the company's Million Dollar Round Table. A trustee of Westboro State Hospital, he has served on the Westboro Finance Committee, was a selectman, town moderator and member of the Republican town committee.

1926

DOUGLAS S. BURNS writes that he is working part time as a real estate salesman (May 1 to Nov. 1) for Sweetwater Lake, Inc., Nineveh, Ind. He spends his winters in Marathon, Fla. . . . WARREN P. GLEASON, a member of the Winter Harbor (Me.) planning board, recently designed a special town ordinance using documents from the State of Maine's various agencies and the University of Maine's model ordinances. His 11-page proposal and shoreland zoning map of the town drew commendations from those gathered at a public hearing last May.

1928

IVAN V. ABADJIEFF is a self-employed research and development engineer in Worcester. . . . WINSLOW C. WENTWORTH has been elected chairman of the board of directors at Greenfield (Mass.) Cooperative Bank. Since his retirement in 1971 he has been a consultant to Western Massachusetts Electric Co. (formerly Turners Falls Power and Electric Co.) with which he was associated for 42 years. He is a registered professional engineer and registered land surveyor. Active in civic affairs, he is past chairman of the Franklin County planning board, past president of the Turners Falls-Montague and the Greenfield Area Chambers of Commerce.

1929

JOHN L. MOOSHIAN, who retired two years ago after 32 years of federal service as a general engineer, recently moved to Sacramento, Calif. following extensive world-wide travel. . . . Dr. ARTHUR H. BURR, head of the department of mechanical engineering at the University of Americas in Puebla, Mexico, is having a busy year. Besides his duties with the university, he has a day-a-week consulting and lecture arrangement with the engineers at a local, modern steel mill (Hylsa). He is also completing a book. He writes that he and his wife are a stone's throw from one of the largest (base area) pyramids in the world and are enjoying the delightful Mexican climate.

Prof. LAURENCE CLEVELAND, retired Northeastern University professor of engineering, was awarded an honorary doctor of engineering by Northeastern at commencement exercises in June at Boston Garden. After graduating from WPI, he received his MSEE from MIT in 1935. In 1929 he started as an instructor at Northeastern; was made assistant professor in 1936; associate professor in 1942 and full professor in 1960. From 1957 to 1959 he was supervisor of

the electrical engineering laboratories. He was executive officer of the electrical engineering department from 1959 to 1962; acting chairman of the EE Dept. from 1962 to 1963; and director of the power systems engineering program from 1963 to 1973. In June of 1973 he was named curriculum director of power program courses in Northeastern's Lincoln College. . . . The ARTHUR W. KNIGHTS, who missed the 45th reunion of the Class of 1929, write that if any members of the class visiting Vermont within a 10-mile radius of St. Johnsbury would like to visit them, to phone 802-748-9000 for directions to their home in White Village, Lower Waterford, Vt.

1931

Mr. and Mrs. EDGAR A. PHANEUF, Sr., celebrated their 40th wedding anniversary on July 4, 1974. They were honored at a special party and by a mass celebrated at St. Matthew's Church in Southville, Mass.

1932

JOHN D. LANE has been named as Worcester's first single assessor in the 24-year history of Plan E, council-manager government. A real estate broker and appraiser since 1940, he was chosen by the City Manager over 24 other candidates for the powerful post. He has the sole power to set property values and to grant or deny tax abatement requests. Lane has been an assistant city assessor since 1972.

1933

JAMES B. RAFTER retired in September as district sales manager for Armco Steel Corp., Middletown, Ohio. Currently he is a consultant in Boca Raton, Fla. . . . On April 1 RALPH J. VOIGT retired following 35 years of service with the Narragansett Electric Co. He writes that he is now catching up on maintenance work on two houses. He also plans to travel and visit his son, Richard, who is an intern in Hanover, N.H.; Ralph, Jr., who is a pharmacist in Colorado; and daughter, Janet, who is a physical therapist in New York City.

1935

JOHN J. MOLLOY retired in December after 37 years of government service. For over 35 years he was with the U.S. Geological Survey. His final position was that of district chief, Ohio District, Water Resources Division, U.S.G.S.

1936

RICHARD W. KEENAN, senior structural engineer and consultant with Stone & Webster, was recently featured in an issue of *Duncan Report*. He is a registered professional engineer in Massachusetts, Georgia, Louisiana and Texas. A member of ASCE, he is also a member of ASCE's committee on publications, Power Division. He belongs to the Massachusetts and National Society of Professional Engineers.

1938

RICHARD W. CLOUES received the "Engineer of the Year Award" from the Peninsular Chapter of the California Society of Professional Engineers (CSPE) in May and the presidential award from the California Society of Professional Engineers in June. He received the first award principally for his work on the CSPE legislation and registration committees which he chaired. He was recognized in the second for distinguished service to the engineering and scientific community, industry, education, and government as well as for his work with the CSPE legislation. Cloues, a project engineer, has been with Bechtel Corp., San Francisco, for nine years. . . . ROBERT A. EVANS, assistant vice president of generation engineering and construction at Northeast Utilities, recently pointed out in an article in the *Times* (Hartford, Conn.) that nuclear plants that produce electricity can produce the heating-cooling energy needed by people in large cities. He went on to say that with a 3,000 megawatt thermal high temperature gas-cooled reactor, working on a gas turbine cycle, that in addition to providing 1,110 MW of electricity, enough heat could be recovered to service 50,000 homes. Evans is past chairman of the Connecticut section of the American Nuclear Society.

PETER P. KOLISS, head of the Loop distribution apparatus and methods department at Bell Labs, Whippany, N.J., celebrated his 35th anniversary with the company in July. He joined Bell in 1939 and in 1963 was appointed head of the outside plant apparatus design and development department. He assumed his present position in 1971 and is responsible for the design and development of connective systems for the telephone cable plant and customer premises. He has three patents for his inventions and has written four articles.

1939

CHARLES H. AMIDON, Jr. had 16 of his circus oil paintings on display at the Barnum Museum in Bridgeport, Conn. last summer. He is a member of the Circus Historical Society. . . . JACK BOYD, former owner of the Nashua (N.H.) Brass Company, now represents Hollis and Brookline in the state legislature, where he has been active on the resource, rehabilitation and development committee. Currently he is fiscal agent for Betty Hall, candidate for the New Hampshire Senate, District 12.

1940

EDWARD E. J. HAFEY, owner of Hafey Air Conditioning Co., Laguna Beach, Calif., writes that his company now distributes, for diversification, a line of hand hydraulic cable and strand cutters in the U.S. and Canada. The cutters are used by telephone companies, electrical contractors, and electric public utilities. His firm also markets 12 volt fluorescent service lights including an underwater model. Ed, along with Mr. and Mrs. DONALD R. BATES, have developed a small import business covering jewelry and works of art from Korea, Nepal, and India. Ed adds that "Don has cornered the market on age-old buddhas from the temples of the Orient."

ARTHUR R. KOERBER is a camp ranger for the Frontier Girl Scout Council in Las Vegas, Nevada. After working for General Electric Co. for 25 years, he is now semi-retired and living at Camp Foxtail, elevation 8,500 ft., doing work similar to the volunteer type he's done for 23 years. He maintains a large campsite.

1941

Prof. CHARLES O. SMITH, of the engineering faculty at the University of Detroit, presented "Case Studies as Laboratory Exercises" in a post-conference workshop on engineering materials at the 82nd Annual Conference of the American Society for Engineering Education held at RPI, Troy, N.Y. in June.

1942

RONALD J. BORRUP is a project engineer at Sierracin, Thermal Systems, Los Angeles, Calif.

1943

CARL I. BENSON, Jr. is chief engineer at Paragon Gears, Inc., in Taunton, Mass. . . . LEONARD HERSHOFF, who is with IBM, writes that he is very active in community affairs, is president of B'nai B'rith, sings with the Mendelssohn Club, and is on the board of directors of his synagogue. He is also busy with United Jewish Appeal. His son, Larry, an honor graduate of Clark University and the University of Rochester, is with the Industrial National Bank in Providence, R.I. His daughter graduated from Clark with honors, also. . . . Dr. RICHARD T. WHITCOMB, who has been with NACA and NASA for 31 years and heads the eight-foot tunnels branch of Langley Research Center's high speed aircraft division, was awarded $25,000 cash in June by NASA for his invention of the supercritical wing. He won the Collier Trophy in 1954 for applying the area rule to design of supersonic aircraft, and last year he received the National Medal of Science, the government's highest honorary scientific award.

1944

GORDON C. ANDERSON, P.E. is a supervisory engineer at Insurance Services Office, New York City.

1945

JAMES J. CLERKIN, Jr. has been elected to the newly created position of executive vice president-planning of General Telephone & Electronics Corporation, Stamford, Conn. Prior to being elected executive vice president-telephone operating group in 1964, he had served as president of GTE International Incorporated since 1961. Mr. Clerkin is a WPI trustee.

Clerkin '45

Barrett '46

1946

RICHARD H. ANSCHUTZ has been named manager of the new management systems department at Pratt & Whitney Aircraft's Research and Development Center in Palm Beach, Fla. Formerly he was manager of the engine program for the Air Force YF-16 lightweight fighter. He has been with the firm 27 years.

JOHN H. BARRETT was recently named vice president-chief operating officer at Chas. T. Main International, Inc., Boston. He will be responsible for general management of the firm's international operations in over 20 countries. He also serves in an executive capacity in the management of joint ventures involving Main and foreign engineering companies. In 1972 he became vice president in charge of international operations. He joined the firm in 1956 as an assistant office engineering manager on the St. Lawrence Power Project. He is a registered professional engineer in eight states and serves as vice chairman of the International Engineering Committee of the American Consulting Engineers Council.

JAMES I. DICK is now vice president — manager of the press division at Harris Corp Fort Worth, Texas. . . . The Rev. PRESCOTT E. GROUT has assumed his ministerial duties for the United Methodist Church (Southbridge, Mass.) and Charlton Methodist. During his career he has served as a pastor in Malden, Springfield, Whitinsville and Peabody and as an officer in a number of ministerial associations. He has also taught at Worcester Junior College, New England Institute and Nichols College. Previously he was employed with Pullet Raising for Egg Production and served as a plant engineer, electrical engineer, and a draftsman.

1948

LAWRENCE MINNICK has joined the Electric Power Research Institute, Palo Alto, Calif., as director of the nuclear engineering and operations department in the Nuclear Power Division. Formerly he was vice president, Yankee Atomic Electric Company, Westboro, Mass.; vice president-engineering, Maine Yankee Atomic Power Company; and vice president, Vermont Yankee Nuclear Power Corporation. He became associated with the Yankee Atomic staff in 1957. Earlier he was with Atomic Power Development Associates, Detroit, Mich.

1949

LEONARD W. FISH, senior vice president-planning, American Gas Association, was the author of the article, "Conservation — A Marketing Dilemma, A Research Challenge" which appeared in the May issue of *Public Utilities Fortnightly*. . . . Currently IRVING HASS is manager, contract publications, for Sperry Gyroscope in Great Neck, N.Y. . . . DAVID N. POULIN, a career state employee, is the new regional transit manager for the Danbury-Bethel (Conn.) area and other points in Fairfield County.

1950

Dr. RICHARD G. BESCHLE, director of the biomedical engineering program at WPI developed the scientifically designed headgear and backpacks which are being used in a perception study conducted jointly by Clark University and WPI. The goal of this study is to determine the development of changes in relation to perception and body action. . . . EVERETT S. CHILD, Jr. is general manager of Child Associates, Inc., Seekonk, Mass. Both he and his wife, Janet, are real estate brokers. . . . HAROLD A. STYFFE, Jr., who recently sold the Iyanough Inn, Hyannis, Mass., is now semi-retired.

ENTER ↑

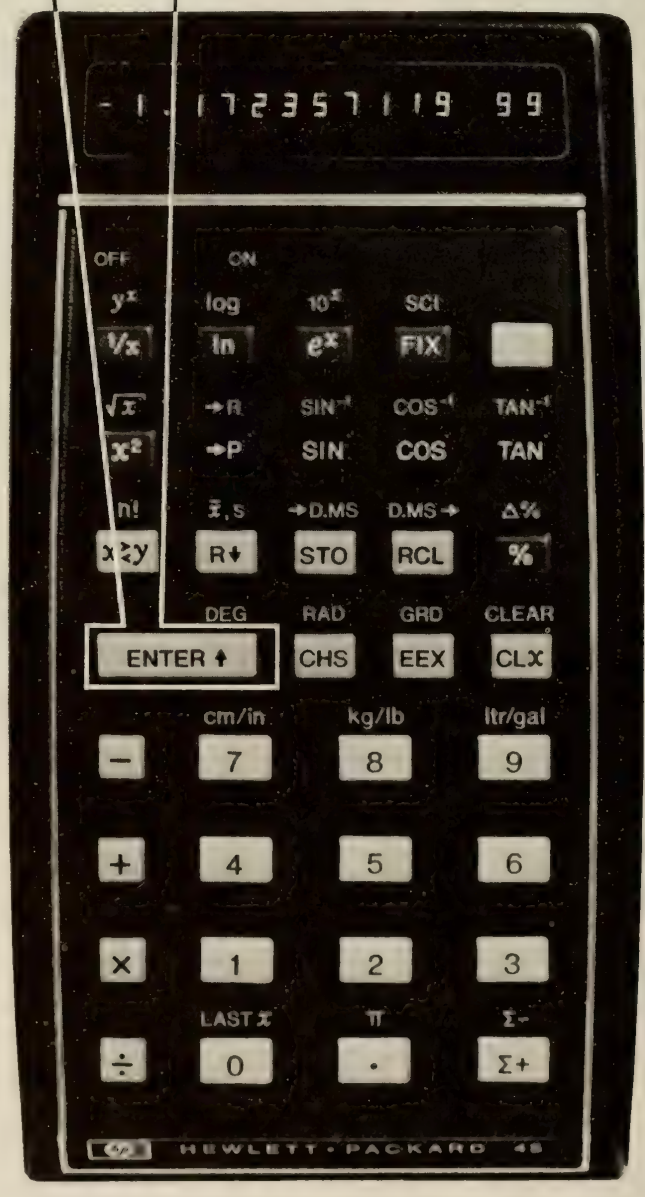
This is your key to unprecedented calculating power. Only Hewlett-Packard offers it.

In 1928 a Polish mathematician, Dr. Jan Lukasiewicz, invented a parenthesis-free but unambiguous language. As it's evolved over the years it's come to be known as Reverse Polish Notation (RPN), and it's become a standard language of computer science.

Today, it's the only language that allows you to "speak" with total consistency to a pocket-sized calculator. And the only pocket-sized calculators that use it are Hewlett-Packard's

ENTER↑ is the key to RPN because it enables you to load data into a 4-Register Operational Stack with the following consequences:

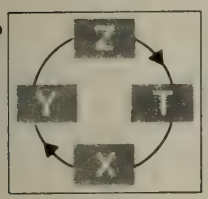
1. You can *always* enter data the same way, i.e. from left to right, the natural way to read any expression.
2. You can *always* proceed through your problem the same way. Once you've entered a number you ask: "Can I operate?" If yes, you perform the operation. If no, you press ENTER↑ and key in the next number.
3. You can see *all* intermediate data anytime, so you can check the progress of your calculations *as you go.*
4. You almost never have to re-enter intermediate answers—a real time-saver, especially when your data have eight or nine digits each.
5. You don't have to think your problem all the way through beforehand to determine the best method of approach.
6. You can easily recover from errors since each operation is performed sequentially, immediately after pressing the appropriate key, and all data stored in the calculator can be easily reviewed.
7. You can communicate with your calculator efficiently, consistently and without ambiguity. You always proceed one way, no matter what the problem.



The HP-45 uses RPN.

That's one reason it's the most powerful pre-programmed pocket-sized scientific calculator. Here are 8 others:

1. It's pre-programmed to handle 44 arithmetic, trigonometric and logarithmic functions and data manipulation operations beyond the basic four (+, −, ×, ÷).

2. 

It offers a 4-Register Operational Stack that saves intermediate answers and automatically retrieves them when they are required in the calculation.

3. It lets you store up to nine separate constants in its nine Addressable Memory Registers.

4. It gives you a "Last X" Register for error correction or multiple operations on the same number. If you get stuck midway through a problem, you can use the "Last X" Register to unravel what you've done.

5. SCI FIX It displays up to 10 significant digits in either fixed-decimal or scientific notation and automatically positions the decimal point throughout its 200-decade range.

6. →D.MS STO D.MS→ RCL It converts angles from decimal degrees, radians or grads to degrees/minutes/seconds and back again.

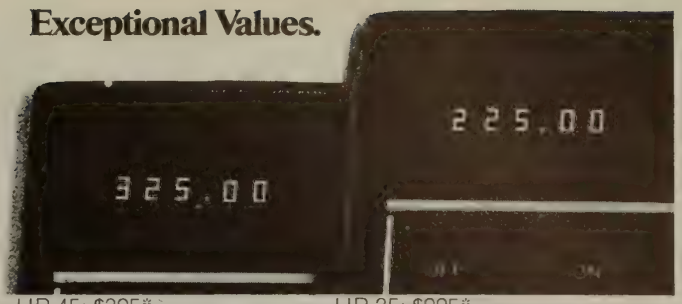
7. →R →P It converts polar coordinates to rectangular coordinates... or vice-versa. In seconds.

8. Its Gold "Shift" Key doubles the functions of 24 keys which increases the HP-45's capability without increasing its size.

The HP-35 uses RPN too.

If the HP-45 is the world's most powerful pre-programmed pocket-sized scientific calculator, the HP-35 is runner-up. It handles 22 functions, has a 4-Register Stack, one Addressable Memory Register and also displays up to 10 digits in either fixed-decimal or scientific notation.

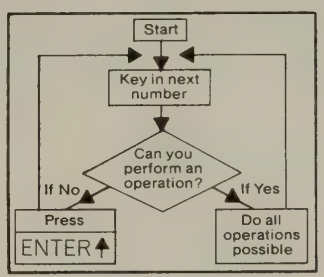
Exceptional Values.



HP-45: $325* HP-35: $225*

The exceptional value of these exceptional machines becomes even more apparent when you consider their prices. You can own the world's most powerful pocket-sized pre-programmed scientific calculator, the HP-45, for just $325.* The HP-35 costs only $225.*

Ask your dealer for our booklet, "ENTER vs. EQUALS."



It demonstrates the superiority of Dr. Lukasiewicz' language by comparing it to other calculators' systems on a problem-by-problem basis, and it explains the algorithm shown to the left which lets you evaluate any expression on a calculator that uses RPN and an Operational Stack. This booklet is must reading for anyone seriously interested in owning a powerful pocket-sized calculator.

Available at leading department stores and college bookstores.

Stop in for a free copy of "Enter vs. Equals," detailed specifications on either the HP-35 or HP-45 and demonstrations of both machines. Call Hewlett-Packard Customer Service, (408) 996-0100 for the dealer nearest you.

Ask about our HP-65 and HP-70 while you're there.

Chances are, he'll also have our two newest pocket calculators on display—the fully programmable HP-65 that lets you write, edit and record programs on magnetic cards and the HP-70 business calculator that can help all business students to excell in their business courses.

A Hewlett-Packard pocket calculator can help you in school today, on the job tomorrow.

HEWLETT hp PACKARD

Sales and service from 172 offices in 65 countries.
Dept. 216 , 19310 Pruneridge Avenue, Cupertino, CA 95014.

614/30

*Domestic U.S.A. prices, not including applicable state and local taxes.

1952

HAROLD R. ALTHEN has been appointed as manager of support systems for the MikroPul division at United States Filter Corporation in Summit, N.J. Previously he was general sales manager for Cochrane Environmental Systems Division. . . . W. DIETER HAUSER writes: "Have recently been appointed as managing director of Airco Singapore (PTE), Ltd., and will reside with my family in Singapore, half way around the world from Worcester and just 85 miles north of the equator."

1955

J. R. NORMAND CASAUBON is now assistant engineering manager at A.T. & T. Co. in New York City. . . . RICHARD L. GOLDMAN serves as product line manager at Aertech Industries, Sunnyvale, Calif. . . . MARSHALL LEVINE was recently awarded patents covering the development of an automated blood analyzer. The instrument, of which Levine is a co-inventor, utilizes a new principal of electronic pattern recognition to examine and classify blood cells, a boon in the detection of leukemia and other blood disorders. The invention is embodied in a computerized microscope which is now being produced by Geometric Data Corporation of Wayne, Pa., a company founded in 1970 by Mr. Levine and Dr. Melvin Miller. The company, a subsidiary of SmithKline Corp., will market the Hematrak instrument to large hospitals and clinics worldwide. . . . CHARLES F. McDONOUGH is plant manager at American Cyanamid's plant at Shippan Point, Stamford, Conn. At this location vulcanized vegetable oils are manufactured for use in rubber compounding.

1956

EDWARD A. BLAKESLEE serves as a research instructor at Upstate Medical Center, Syracuse N.Y. . . . JOHN K. DERBY has been appointed business manager for polyvinyl alcohol in the Polymers Chemicals Division of Air Products and Chemicals, Inc., Allentown, Pa. He will be responsible for the production and marketing of polyvinyl alcohol, including the firm's Vinol and Unisize lines. Polyvinyl is used in the adhesive, paper, plastics, and textile industries.

1957

PAUL R. BESWICK of Beswick Engineering, Ipswich, Mass., visited THORDUR GRONDAL in Reykjavik, Iceland last summer. . . . RICHARD F. CHARRON received his MBA from Rutgers in May. . . . PAUL M. MITCHELL, SIM, is on a temporary two-year assignment with the world-wide expansion of operations of Dresser Industries and is located in Brussels, Belgium. He is a product manager.

DAVID N. OLSON serves as sales manager for Fleetwood Enterprises, Riverside, Calif

1958

Dr. JOSEPH E. BOGGIO has been named as one of the Outstanding Educators of America for 1974. He is chairman of the chemistry department in the undergraduate College of Arts and Sciences at Fairfield (Conn.) University and has been with the university since 1964. . . . WILLIAM H. HOPF serves as manager of engineering in the Irvington-Moore division of United States Natural Resources, Inc., Jacksonville, Fla. . . . HOWARD B. PRITZ was one of 50 inventors recently honored for patents they received during 1973 as staff members of the Columbus (Ohio) Laboratories of Battelle Memorial Institute. He is a co-holder of a patent for developing apparatus to stencil-mark a moving product. . . . Dr. SHELDEN H. RADIN has been promoted to the rank of full professor of physics at Lehigh University, Bethlehem, Pa. He has been a member of the faculty since 1963 and serves as chairman of the physics achievement test committee and the college entrance examination board. A specialist in the fields of kinetic theory, non-equilibrium statistical mechanics and plasma physics, he is the author of a number of technical articles

and reviews. He has served as a physics lecturer under the Choate School honors program and as a physicist with Aeronautical Research Associates of Princeton, N.J.

1959

LEO F. COURNOYER is now director of program evaluation for the Santa Clara Calif. Valley Water District. A senior engineer with the San Jose-based firm, he had been employed by the Federal Power Commission in Washington, D.C. . . . THOMAS HUMPHREY, director of the Bureau of Transportation Planning and Development for the Massachusetts Department of Commerce, spoke on the subject of local highways and the national highway building program at the July meeting of the Springfield Kiwanis Club. . . . WILLIAM A. SAIMOND is a senior engineer at Pratt & Whitney Aircraft in South Windsor, Conn. . . . EDWARD A. SAULNIER writes that IBM is now marketing a series of three computer programs which he has written which provide closed loop control of plastic injection molding machines. In conjunction with this project, he presented a paper on the subject at the Regional Technical Conference of the Society of Plastic Engineers in Chicago last March. He is assigned as an advisory systems engineer at IBM's Worcester branch. The Saulniers have four children, Susan (11), Marianne (9), Christopher (6) and Jonathan (2). . . . DAVID H. TREADWELL, Jr., serves as a project engineer at Anderson-Nichols, Boston, Mass

1961

Currently RICHARD S. ADLER serves as district operations manager for American Telephone & Telegraph Co. (Longlines) in Springfield, Mass. . . . DAVID R. BAKER has been named manager of U.S. industry and application sales at the Foxboro (Mass.) Company. . . . Dr. JAY A. FOX has received a $75 special act and service award for writing a research article published in the April 1974 issue of the *Applied Physics Letter Journal*. He is a research physicist at Fort Belvoir, Va. and a member of the American Association of Physics Teachers. This is the fourth article for which he has received an award since going to Fort Belvoir in 1971. . . . Dr. H. RICHARD FREEMAN is serving as attitude control subsystem manager in the recently launched sixth application technology satellite (ATS-6) for the National Aeronautics and Space Administration. The ATS-6 will be used for the next several years to test a variety of new space communications concepts requiring the use of a spacecraft in geo-synchronous orbit. Dr. Freeman, who joined the Goddard Space Flight staff in 1964, was responsible for the design, analysis, fabrication and testing of the ATS-6 attitude control system.

BRADLEY E. HOSMER has been appointed vice president of manufacturing at Branson Sonic Power Co., Danbury, Conn. He is responsible for the standard products, ultrasonic horn production, and special systems manufacturing groups. The company produces and markets high power ultrasonic equipment used in rigid plastics welding, ceramic machinery, fabric and film sealing, fluxless soldering and metal welding. Previously Hosmer was with Eastman Kodak, Gillette, Warner-Lambert, General Mills and Booz-Allen and Hamilton in New York. . . . RICHARD B. HOSMER is a senior airport development specialist for the New York State Department of Transportation in Albany. . . . NORBERT F. TOCZKO is a civil engineer at the Navy Communication Station in Greece, where he expects to remain for two years. Last year he passed the exam for his professional engineering registration in the District of Columbia. In December the Toczkos became the parents of their second child, a daughter, Amy. . . . JAMES M. TOLOS is manager-overseas engineer for the American International Group in New York City. . . . VEIKKO O. UOTINEN works as a senior engineer in the nuclear power generation division at Babcock & Wilcox Co. Lynchburg, Va.

1962

Born: to the Rev. and Mrs. ANDREW D. TERWILLEGER of Elmwood, Connecticut, their first daughter, Michelle Joy, on January 21, 1974.

Presently STEPHEN M. WELLS is a manager for I.T.T., in St. Louis, Missouri.

© 1974 Mobil Oil Corporation

Some of our most exciting projects won't pay off for 25 years.

Is there a future in the oil business? You better believe it!

Look at some of the things we'll be doing over the next 25 years, and beyond:

Exploring the far corners of the globe, in a never-ending search for oil and gas;

Looking for it under the oceans, too, in waters a mile deep and more;

Expanding our fleet of supertankers (200,000 tons and larger), and building deepwater ports for faster, better distribution of petroleum throughout the world;

Building newer, bigger, cleaner, more efficient plants to refine crude oil into useful products;

Entering promising new fields like extracting petroleum products from oil shale...converting coal into liquid fuels...even learning how to tap the sun's energy.

In our 106 years, we've never had a future that looked so exciting.

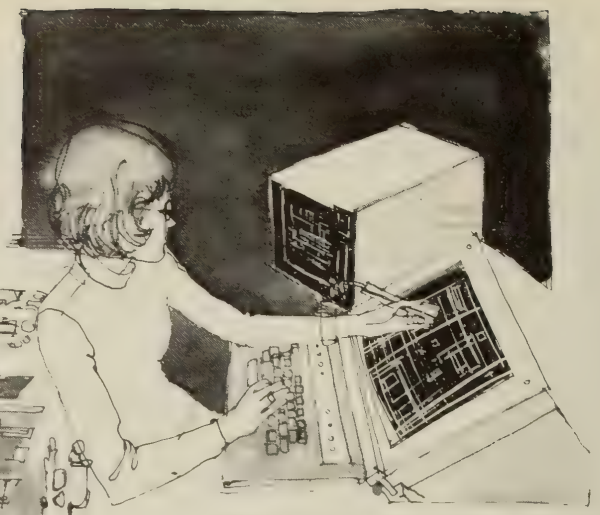
Is there a future in the oil business? Ask us again in 2001.

Your placement officer knows all about us. Or if you'd rather, write to R. W. Brocksbank, Manager of College Relations, Mobil Oil Corporation, Dept. 2315, 150 East 42nd Street, New York, N.Y. 10017.

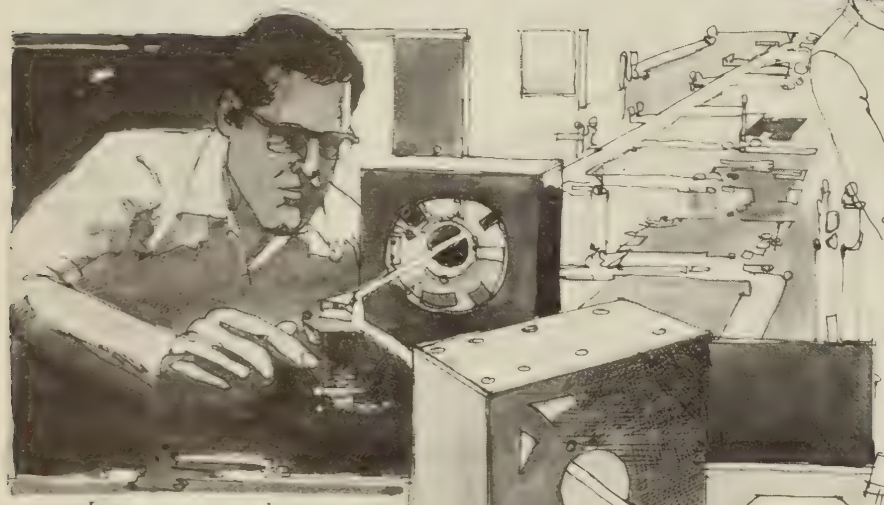
Mobil®

An Equal Opportunity Employer M/F

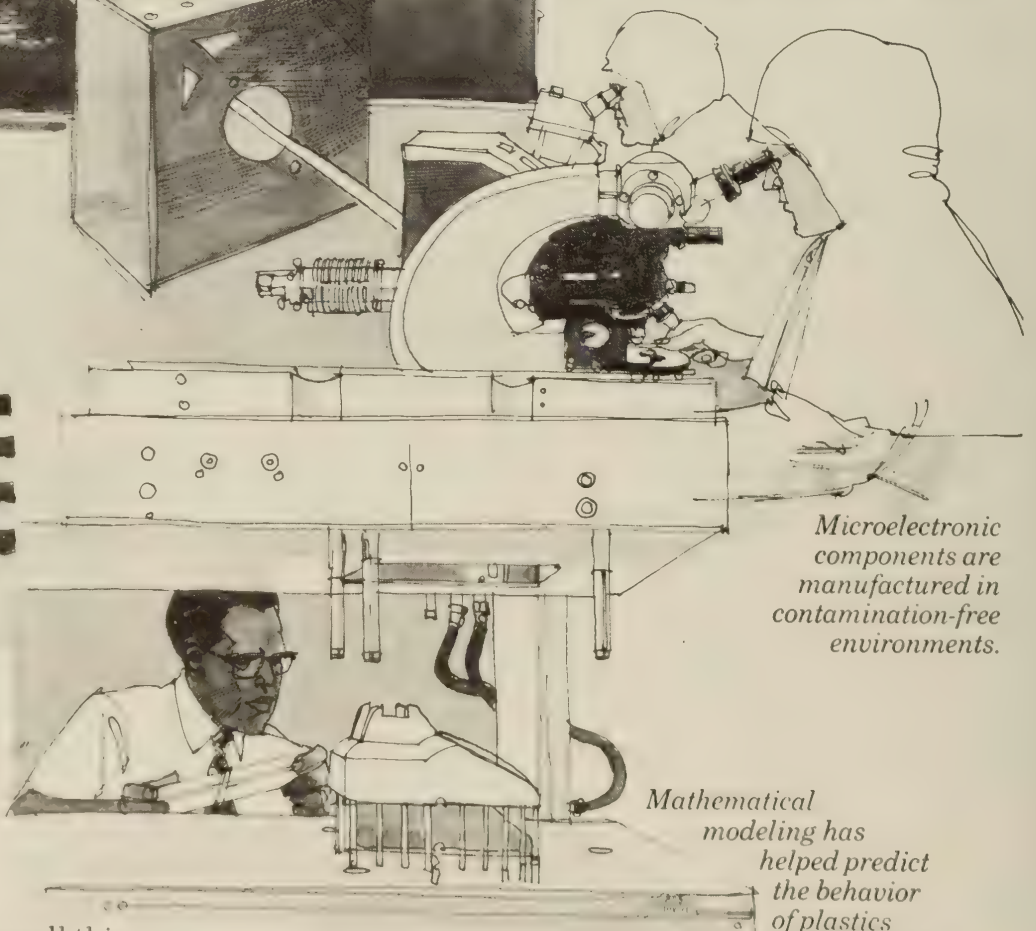
At Western Electric, we put science to work.



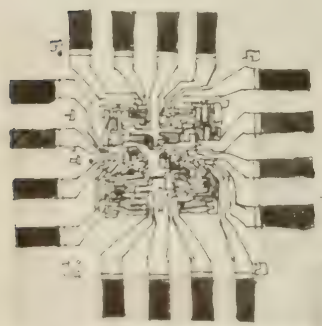
The installation diagrams for telephone switching centers have been generated through computer graphics.



Lasers are used in a variety of ways—from measuring to drilling and welding.



Microelectronic components are manufactured in contamination-free environments.



Like transistors before them, integrated circuits are spreading into every nook and cranny of the Bell System.

Mathematical modeling has helped predict the behavior of plastics in injection molding.

Managing all this is a new breed of talented people. Whatever their specialties, they also have to be comfortable working in other fundamental disciplines once left only to "pure scientists". At Western Electric, we put science to work.

Western Electric

We make things that bring people closer.

1963

A. STEPHEN OTIS has been transferred to Birmingham, Ala., where he is starting a new institutional bond operation for Merrill Lynch. . . . DONALD H. PASS, SIM, was recently appointed superintendent of rolling at U.S. Steel's Lorain-Cuyahoga (Ohio) works. In his new position he will direct all rolling operations at Lorain works which include the primary mills and the bar mills. He is a member of the Lorain Area Chamber of Commerce, Lorain Works Management Club, Elyria Country Club, and is also the chairman of the current United Fund campaign for Lorain works.

1964

Married: ERNEST E. CHENOWETH to Miss Eunice Froeliger in South Woodstock, Vermont on August 17, 1974. Mrs. Chenoweth graduated from the University of Connecticut and has been a counselor for the Vermont State Department of Corrections. Her husband teaches and coaches at Thayer Academy in Braintree, Mass. and was a member of the summer faculty of Cape Cod Community College.

Currently ALFRED H. HEMINGWAY, Jr. is an attorney with Morgan, Finnegan, Durham & Pine in New York City. . . . RONALD E. LUBOWICZ was admitted to the Massachusetts bar in June. He attended law school at the University of Denver and is now employed by Distrigas Corp. of Boston. . . . CLIFFORD M. MacDONALD, Jr. is a major in the U.S. Army with the 3rd Infantry Division. . . . BRUCE OCHIEANO has been appointed a vice president with William Blair, Inc. of Los Altos, Calif., a real estate investment firm specializing in the acquisition and management of income property for private investors. . . . THOMAS A. ZAGRYN is a training supervisor at Pratt & Whitney, East Hartford, Conn.

1965

Married: DONALD G. MUNSON to Miss Janis E. Tremblay on May 11, 1974 in Topsfield, Massachusetts. Mrs. Munson graduated from Bradford Junior College and the University of Miami. Her husband is with United Engineers and Constructors, Inc.

PETER J. BOWES is in sales at the Medusa Cement Co., Cleveland, Ohio. . . . BURTON SHAIR has been appointed an electrical engineer at Stone & Webster Engineering Corp., Boston. Associated with the firm since 1966, Shair is a registered professional engineer in Massachusetts and Connecticut. . . . Dr. DONALD C. SUNDBERG is with the department of chemical engineering at the University of Idaho in Moscow. . . . U.S. Air Force Captain ERIC P. WARMAN has received the U.S. Army Commendation Medal at Hurlburt Field, Fla. He was decorated for meritorious service as commander of Detachment 8 of the 16th Weather Squadron, Ft. Riley, Kansas. He is now at Hurlburt Field where he serves as chief of utilities for the 4751st Air Defense Squadron, a unit of the Aerospace Defense Command.

1966

ROGER J. ARMATA received his MBA from the University of Hartford in Connecticut in June. He is a methods supervisor for the Torrington Company. . . . Capt. ROLAND C. BOUCHARD (USAF) is a system integration engineer in the program office at Tactical Loran System, L.G. Hanscom Field, Mass.

WILLIAM F. ELLIOTT has been named to the newly created post of vice provost for enrollment planning at Carnegie-Mellon University, Pittsburgh, Pa. He will be responsible for coordination of admissions, registration, financial aid, and career planning. He joined the university in 1970 as associate director of admissions and in 1971 was named director. From 1966 until 1970 he was assistant director of admissions at WPI. He is past president of the Pennsylvania Association of College Admissions Counselors and is an assembly delegate of the National Association of College Admissions Counselors.

FRED T. ERSKINE III, a graduate research assistant in physics and astronomy at the University of Iowa, also works part time at Clark Lake Radio Observatory, Borrego Springs, Calif. . . . DAVID R. KLIMAJ has received a master's degree in engineering administration from George Washington University, Washington, D.C. He is still employed with the U.S. Army Night Vision Laboratory, Ft. Belvoir, Va. . . . ERNEST KUNZ serves as a technical representative at Climax Molybdenum Co. Greenwich, Conn. He also is president of Afton Cleaners, Inc., Florham Park, N.J. and a co-owner of Kunz & Henzel, R.E. Investments. . . . ROBERT S. LEVINE is manager-production and inventory control at General Electric, Albuquerque, N.M.

GRANT P. MAIER received his master of science degree in mechanical engineering from RPI on June 2. He is a senior analytical engineer with Pratt & Whitney, East Hartford, Conn. . . . MICHAEL C. NAPOLITANO is an electronic controls engineer at Butler Automatic, Inc., Canton, Mass. . . . KYLE J. ONDRICEK has accepted the position of new products manager for B.F. Perkins in Chicopee, Mass. . . . RONALD F. PICHIERRI is a senior mechanical engineer at Laser Graphic Systems Corp., Sudbury, Mass. . . . WILLIAM E. SULLIVAN works as a senior information systems specialist at Computer Sciences Corporation in Piscataway, N.J. . . . HARRY F. WOOD III, a registered land surveyor in Meredith, N.H., is serving as president of the New Hampshire Land Surveyors Association. A former vice president of the association, he had also served as a director. He is a member of the American Congress of Surveying and Mapping and last year formed Associated Surveyors of Meredith.

1967

Married: ROY C. FEDOTOFF and Miss Lydia N. Oliynyk on June 22, 1974 in Willimantic, Conneticut. Mrs. Fedotoff graduated from the University of Connecticut's School of Education and is currently enrolled in a master's program in reading at Boston University. The bridegroom, who has an ED degree from Polytechnic Institute of New York, is a consulting engineer for Metcalf and Eddy in Boston.

Married: JOSEPH F. GOULART and Miss Patricia Steckmyer on June 24 in Grand Island, Nebraska. The bride is studying industrial engineering at the University of Michigan in Dearborn. Her husband is a product development engineer for the Ford Motor Company. . . . ELLIOT F. WHIPPLE and Miss Dawn Arlene Tetreault on June 29, 1974 in Attleboro, Massachusetts. PAUL MALNATI, '66 and GEORGE H. RAND, Jr. served as ushers. Mrs. Whipple is a graduate of the Bristol Community College School of Nursing and will accept a position as a registered nurse at the Hospital of the University of Pennsylvania. Her husband is a second year MBA candidate at the Wharton School of Finance at the University of Pennsylvania.

Born: to Mr. and Mrs. RICHARD A. ORMSBEE their first child, a daughter, Sandra Lynn, on September 26, 1973. Ormsbee is a food technologist working in the fats and oils research laboratory at the Best Foods Research Center in Union, N.J.

ROGER V. BARTHOLOMEW is teaching at Strake Jesuit College Prep in Houston, Texas. . . . STEVEN FRYMER won first place in the 15th New England Amateur Chess Championship Tournament which was held in Worcester in July. He is an engineer for the state of Massachusetts. . . . RICHARD M. GUTKOWSKI has received a doctorate degree in civil engineering from the University of Wisconsin in Madison. He is an assistant professor of civil engineering at Colorado State University. . . . RONALD A. MUCCI recently received his PhD in electrical engineering at the University of Rhode Island. His thesis was: "Design and Spatial and Temporal Filters for Rejection of Localized Interferences." He did his master's work at the University of Michigan. Currently he is associated with Raytheon.

Dr. EARL T. MYERS, senior scientist with the General Electric Company, Fitchburg, Mass., was the featured speaker at the second annual School and Scholarship Awards Night sponsored by the Montachusett Branch of the NAACP in Fitchburg last June. Dr. Myers is the author of numerous articles on aerodynamics and was a former senior consulting scientist in aerodynamics for the Avco Corp. . . . Presently JOHN B. NANO, Jr. holds the post of manager of process development at W.R. Grace & Co., Lexington, Mass. . . . LAWRENCE E. NELSON received his MA from the University of Northern Colorado last spring. . . . Capt. GEORGE POMFRET (USAF) has been assigned to Holloman AFB, N.M. from Vandenberg AFB, Calif. He is an astronautical engineer with a unit of the Air Force Systems Command. . . . STEVEN E. SCHUMER is with United Engineers & Constructors, Philadelphia, Pa. He works on nuclear power plants. . . . NEIL M. SHEA recently received his PhD in physics from Rensselaer Polytechnic Institute. . . . HOWARD H. SHORE, who has received his Juris Doctor from the University of San Diego Law School and his LL.M from the London School of Economics and Political Science, is now an attorney in the San Diego County district attorney's office. . . . Dr. JOHN E. SONNE received his VMD degree from the University of Pennsylvania in June and is now practicing in Syracuse, N.Y., specializing in small animal medicine. . . . RICHARD A. SYMONDS is a senior mechanical engineer at Catalytic, Inc.

(engineering consultants), in Charlotte, N.C. The Symondses, the parents of two daughters, have adopted an eight-month old Vietnamese boy, Kevin Richard, who arrived from Saigon in April.

1968

Married: ROBERT E. ANDERSON and Miss Marcia J. Metzler on June 14, 1974 in New Britain, Connecticut. The bride graduated from the Methodist Hospital of Brooklyn (N.Y.) School of Nursing and is with the Connecticut Red Cross Blood Program. The bridegroom is a senior engineer at Southern New England Telephone Co. in the coordination and construction service. . . . GEORGE D. BURGESS to Miss Margaret C. Hansen in Worcester on June 9, 1974. Mrs. Burgess graduated from Maria Regina College, Syracuse, N.Y. The groom is with York Air Conditioning Co. in York, Pa. . . .

Born: To Dr. and Mrs. DONALD C. ALDRICH a daughter, Lori Ann, on December 15, 1973. Aldrich, who received his PhD from MIT in May, is a research engineer at E. I. duPont in Philadelphia. . . . To Mr. and Mrs. ROBERT MEADER a son, Glenn, on May 9, 1974. (Glenn has an older brother, age 3.) Meader has moved to the position of regional planner with the Coastal Area Planning and Development Commission and is headquartered in Savannah, Ga., although he deals with the entire coast of Georgia.

KENNETH E. BATTLE is a senior process technology engineer for Monsanto in Cincinnati, Ohio. He writes that he is greatly looking forward to a two-to-three year assignment on projects in Belgium and France starting this fall. . . . IVAN V. BEGGS is studying for his master of divinity degree at Lutheran Theological Seminary, Columbus, Ohio. . . . DONALD P. BERGSTROM serves as a field engineer at Cianbro Corp., Pittsfield, Maine. . . . RICHARD E. BROGGI works as a estimator at C. G. Smith Co., Harvey, La. . . . NORMAN E. BRUNELL joined the legal department as a patent attorney at Beckman Instruments, Inc., in Fullerton, Calif. last July. . . . FRANK H. CORBIERE is in missionary training at Literature Crusader World Headquarters, Prospect Heights, Ill. Next March he is slated to go to Cartagena, Colombia in South America, where, with a team of 10, he will help establish a church. Previously he was an industrial engineer at Uniroyal in Naugatuck, Conn.

RONALD E. JODOIN starts this fall as a visiting assistant professor in physics at Rochester (N.Y.) Institute of Technology.

ALLEN A. KUTZ received his PhD in Chemistry from RPI (Troy, N.Y.) last May. . . . PETER L. MARZETTA is employed at the Naval Underwater Systems Center, Portsmouth, R.I. . . . PHILIP A. MATTSON is at Chattanooga State Technical & Community College, Chattanooga, Tenn. . . . JOHN H. McCABE has been promoted to vice president of Carl Gordon Industries, Inc., Worcester. Previously he had served as assistant treasurer for Gordon Industries, Inc., parent Company of Fox Specialty, Inc., Oxford Plastics, Inc., and Hammond Plastics, the nation's largest independent manufacturer and distributor of polystyrene. He joined Gordon in 1970 as director of information systems for Hammond Plastics. Last year he was promoted to assistant treasurer. He also serves as treasurer for Fox Specialty, Inc., and Oxford Plastics, Inc.

WILLIAM J. McCARTHY has been promoted to assistant actuary at State Mutual Life Assurance Co. of America, Worcester. He joined State Mutual as an actuarial associate in 1971 and was promoted to senior actuarial associate two years later. Recently he became a fellow of the Society of Actuaries. . . . DAVID B. MORRIS is a new process development engineer at Abcor, Inc., Cambridge, Mass. . . . CARY A. PALULIS has been promoted to specialty products coordinator at Exxon Company, U.S.A.'s Pelham, N.Y. area office. . . . Presently ROBERT T. PLEINES serves as a project engineer for Monsanto in Indian Orchard, Mass. . . . FRANCIS J. POSSELT is a senior facilities engineer at Griffin Pipe Products Co., Florence, N.J. . . . DOUGLAS A. RILEY works as a resident engineer for Camp Dresser & McKee in Boston. . . . Dr. E. WAYNE TURNBLOM is a research chemist for Eastman Kodak Co., Rochester, N.Y. From 1972 until 1974 he was an instructor at Princeton University.

1969

Married: MICHAEL GAN and Miss Judith M. Znamierowski in Enfield, Connecticut in June. The bride attended Central Connecticut State and AIC, Springfield, Mass. Her husband is with Pratt & Whitney, East Hartford, Conn. . . . ROBERT J. MAGARIAN to Miss Suzanne Sharigian on June 30 in Worcester. Mrs. Magarian graduated from Framingham State College and teaches in Marion, Mass. . . . KIMBALL M. WATSON and Miss Rebecca L. Duncklee on June 29, 1974 in West Lebanon, New Hampshire. Mrs. Watson, a graduate of the University of New Hampshire, is a music supervisor in the Concord schools. Her husband is with IBM in Burlington, Vt.

Dr. ARTHUR M. AFRAME, who recently received his PhD in physics from RPI, is currently a physicist at MEPPSCO in Boston. . . . U.S. Air Force Capt. WARREN L. ANDERSON has graduated from the Strategic Air Command's missile combat crew operational readiness training course at Vandenberg AFB, Calif. He is now at Grand Forks AFB, N.D. for duty and training as a missile launch officer. . . . DENNIS AGIN of Maynard, Mass., a systems analyst at Raytheon, recently served as campaign manager for William C. Mullin, a candidate for the Democratic nomination for the office of state representative to the General Court from the 48th Middlesex District. Agin, who is a member of Citizens for Participation in Political Activities, has also been very active in scouting. . . . ANDREW F. DURETTE is vice president-engineering at Micro Components Corp., Cranston, R.I.

After spending nine months in Annaba, Algeria with General Electric on business, DAVID W. EATON is now a systems programmer with Honeywell, Inc. in Phoenix, Arizona. . . . JOHN C. GAVITT is a field engineer with Sperry Gyro / Sperry Rand Corp., Great Neck, N.Y. . . . HAROLD F. HEMOND has received his MA in botany from Connecticut College in New London. Currently he is deputy director of Water and Related Resources for the Connecticut Department of Environmental Protection. . . . PATRICK W. KELLEY and ALEXANDER R. MALCOLM have received MBA's from Rutgers in New Jersey. . . . ROBERT W. MAYER is a research engineer for Amerace Corp. in the Development Center at Washington Twp., N.J. . . . ROBERT P. ROCCO has received his doctor of medicine degree from the College of Medicine at the University of Vermont. He will intern at the Good Samaritan Hospital in Portland, Oregon. . . . BARRY N. SHIFFRIN recently received his master's degree in computer systems from the State University of New York at Binghamton.

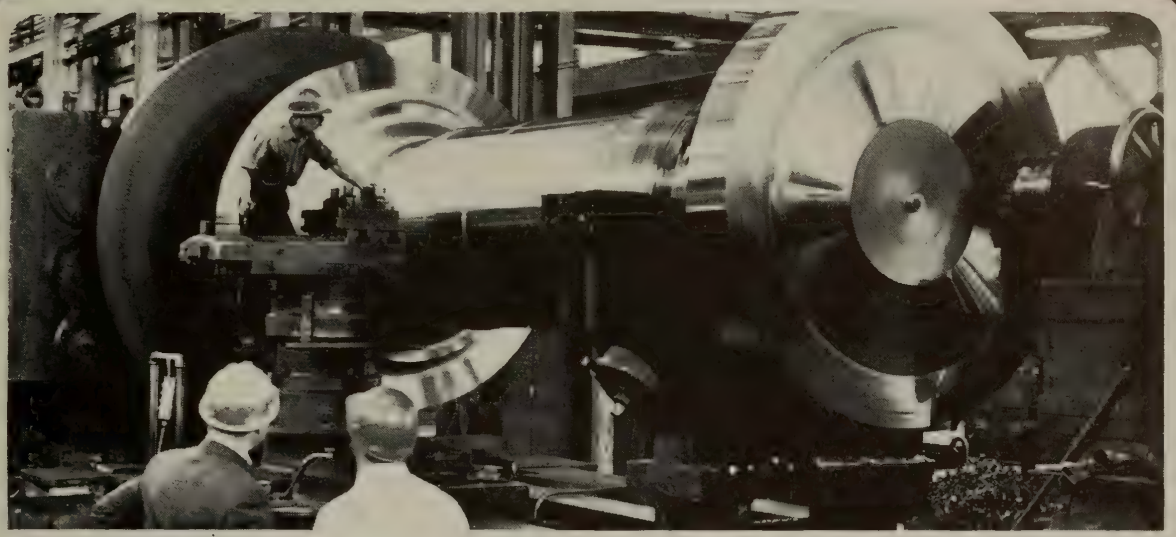
1970

Married: JOHN J. RING, Jr. to Miss Elvera H. Bodruk in Milford, Massachusetts in June. Mrs. Ring is employed at Cushing Hospital in Framingham. The groom is a quality control engineer at 3M Corporation in Cambridge, Mass. . . .

GREGORY W. BACKSTROM has received his MBA from the University of Michigan and is now a financial analyst at Norton Company in Worcester. . . . DINKAR V. DESAI works for Kulite Semiconductor, Inc. in Ridgefield, N.J. . . . DOMENIC J. FORCELLA, Jr. is an environmental consultant to Central Connecticut State College in a federally funded program offering assistance to communities with environmental problems. He also serves on the Plainville (Conn.) Inland Wetlands Commission. Having recently completed course requirements for his MSCE at WPI, he now plans to enter the University of Connecticut Law School. . . . JOHN J. LYONS is a systems programmer at Norton Co., Worcester. . . . Presently MICHAEL D. McCORMICK serves as a product specialist and sales planner for the G.E. semi-conductor products department in Auburn, N.Y.

DAVID T. ROCKWELL, who has just completed three years service as an army officer, was recently named executive director of the Community Health Education Council, Inc., West Springfield, Mass. He was one of the first volunteers to work with CHEC when it started in 1970. In the army he served as a finance corps officer at Fort Carson, Colo., and headed the Dependent Youth Activity Program as well as the Alcohol and Drug Education Center in Fort Carson. . . . Dr. SOLOMON ROSENBLATT has graduated from the University of Connecticut Medical School in Farmington and expects to intern at Mercy Hospital Medical Center in San Diego, Calif. . . . RALPH F. SBROGNA received his juris doctor degree from Suffolk University Law School, Boston, in June and is now associated with the law firm of Crowe & Knoll in Boston. . . . MICHAEL F. SULLIVAN is a field engineer for Combustion Engineering in

manufacturing, sure!



We make big tonnage items and small ones too. Naturally, marketing these products takes a well-coordinated sales effort.

At Bethlehem we manufacture a wide variety of products serving many important markets. The steel business is our nation's basic industry. Engineers seeking meaningful careers will find plenty of opportunities with us.

What can an engineer do in our steel plant operations? You name it—production supervision, quality and process control, mechanical design and maintenance. How about Sales work? A career in district or home office sales, as a contracting manager, or as a sales engineer are all possibilities.

If you think you can produce, why not give us a chance to sell you on our corporation?

Watch for our recruiter's visit. Meantime, pick up a copy of our booklet "Bethlehem Steel's Loop Course" at your placement office. Or write: Director—College Relations, Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL

an equal opportunity employer

MORGAN
CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

Windsor, Conn. . . . PHILIP C. WARREN has been promoted to mechanical superintendent at Nashua Corp. in Nashua, N.H. He joined the firm in 1973 after completing three years service as a maintenance officer for infantry ordnance in the U.S. Army. Since he became associated with the corporation, he has successfully completed several projects in the Toner Manufacturing Area. . . . ALAN P. ZABARSKY is a supervisor, system requirements and planning group, Bell Labs, Indianapolis, Ind.

1971

Married: CHARLES I. ANDRIANOPOULOS and Miss Deborah Ann Waldron in Worcester on July 7, 1974. The bride, an art teacher, graduated from Anna Maria College, Paxton. The bridegroom is with New England Telephone Co., Framingham, Mass. . . . EDWARD E. GEORGE, Jr. to Miss Patricia A. Fogarty on June 16, 1974 in Worcester. Mrs. George is with New England Telephone Co. The groom is a production planner at Jamesbury Corporation. . . . LAWRENCE E. RAINVILLE to Miss Honora E. O'Hearn on June 29, 1974 in Stoughton, Massachusetts. Mrs. Rainville graduated from Framingham State College and teaches mathematics at Randolph High School. Her husband is with Datatrol in Hudson, Mass.

Married: MARK R. SAVIET and Miss Patricia M. Iglar on July 27 in Fitchburg, Massachusetts. The bride, an Anna Maria graduate, teaches music in Ashburnham. The groom is employed by Jamesbury Corp., Worcester. . . . GEORGE M. SIMMONS to Miss Mary Ann DosSantos on June 1 in Waterbury, Connecticut. Mrs. Simmons graduated from the University of Connecticut. . . . RONALD C. STRAND to Miss Joann D. Ritchie on June 23, 1974 in Lexington, Massachusetts. Mrs Strand graduated from Framingham State College. . . . ERNEST M. WOLSHIN and Miss Susan M. Kowalchuk on June 22 in Norwich, Connecticut. The bride is a graduate of Anna Maria College. Her husband is a clinical research associate for Astra Pharmaceutical Products, Inc., Worcester

ROBERT J. ALLARD, Jr. is manager of real estate and construction at Commonwealth Trading, Inc., Avon, Mass. . . . DAVID A. BAILEY works at Vitro Labs, Silver Spring, Md. 0316

. . . EDWARD F. CUNNINGHAM serves as a sales engineer at Fafnir Bearing Co., New Britain, Conn. . . . JOHN A. GIORDANO is a planning assistant at Worcester (Mass.) Bancorp. . . . GARRY GLECKAL has been appointed a math counsellor and graphic arts instructor by the North Middlesex (Mass.) Regional District School Committee. . . . ANDREW J. GRIFFIN is employed as a development engineer at American Optical in Bedford, Mass. . . . THEODORE D. LYNCH holds the position of manager of commercial sales and marketing at Fiber Materials, Inc., Biddeford, Me.

CLAUDE P. MANCEL is manager of Procter & Gamble's European Technical Center in Strombeek-Bever, Belgium. . . . ROBERT P. MILLS, Jr. has been promoted to senior acturial associate at State Mutual Life Assurance Co. of America in Worcester. He joined State Mutual as an actuarial assistant in 1971 and was promoted to actuarial associate in 1973. . . . JOHN NIESTEMSKI is with General Electric in Syracuse, N.Y. . . . FRED MULLIGAN works as a project engineer at Cutler Associates, Worcester. . . . JOHN G. PARILLO has received his M.Eng., environmental engineering, from RPI in Troy, N.Y. . . . WILLIAM A. PHILBROOK has been promoted to the rank of first lieutenant in Headquarters Company, 1st Battalion 181st Infantry of the 26th (Yankee) Infantry Division in Worcester. He was appointed to the Massachusetts Army National Guard in 1973. He is employed by the David Clark Co., Inc., as an electrical engineer.

JOHN G. PLONSKY received his MBA from the University of Massachusetts in June and is currently employed as a contract administrator for General Electric in Binghamton, N.Y. . . . RALPH REDDICK, who is with Kimberly-Clark, played string bass in a jazz concert performed last June in memory of the great Duke Ellington in Thomaston, Conn. He has played the lead in "Music Man" and is now studying composition at Hartt School of Music. He has also taught guitar, is studying piano, and plays the bagpipes in the Upper Guernseytown Pipe Band. During the summer he attended a six-week session in composition in Europe with the Siena Summer Session in Music Association. . . . RAYMOND SKOWYRA is attending Harvard University this fall. . . . RICHARD E. TEITELMAN is a systems education instructor at Sperry UNIVAC in Princeton, N.J.

1972

Married: MARK A. FRITZ to Miss Marcia J. Lamberto in Worcester on May 26, 1974. Mrs. Fritz graduated from Anna Maria College, Paxton. Her husband is president of Yankee Data, Inc., Berlin, N.H. . . . MICHAEL L. KUDRAVETZ to Miss Ellen M. Tousignant in Biddeford, Maine on July 27, 1974. The bride is a staff member at Peter Bent Brigham Hospital, Boston. Mr. Kudravetz is a faculty member and chairman of the science department at Gardner (Mass.) High School. . . . TIMOTHY F. LASKOWSKI to Miss Janice P. Malachowski on June 22, 1974 in Chelsea, Massachusetts. The bride was an elementary teacher at St. Stanislaus School in Chelsea. The groom is an analytical engineer for Power Technologies, Inc. of Schenectady, N.Y. . . . DAVID NOWAK and Miss Nancy Ann Zuraw on May 25, 1974 in Northampton, Massachusetts. Mrs. Nowak graduated from Worcester Memorial Hospital School of Nursing. The bridegroom has accepted a position in the ocean engineering division of General Dynamics, Groton, Conn.

Married: JOHN O'BRIEN and Miss Marilyn Thorne of Millis, Massachusetts in May. The bride, a Becker graduate, is a medical secretary. Her husband works for General Electric, San Jose, Calif., where he is in advanced production planning in the nuclear energy division. . . . RICHARD L. PASTORE and Miss Catherine Procopio in June in East Greenwich, Rhode Island. Mrs. Pastore graduated from Albertus Magnus College. Mr. Pastore has been studying at WPI as a graduate student. . . . ROBERT H. PINCUS to Miss Alice Hibbert on June 1, 1974. The bride received her BA in chemistry from Anna Maria College and her MS from Holy Cross. The bridegroom received his MSEE from the University of New Hampshire this year and is now with GTE Sylvania in Needham Heights, Mass. . . . JOHN H. TOLOCZKO to Miss Paula H. Goldsmith of Framingham, Massachusetts on July 6, 1974. Mrs. Toloczko graduated from Quinsigamond Community College, Worcester. The groom is a quality control engineer for Hamilton Standard in Windsor Locks, Conn.

JOSEPH ARAYAS received his MBA degree at the May graduation of Boston University's College of Business Administration. . . . CHARLES J. BRINE recently was awarded his master's degree in chemical oceanography from the College of Marine Studies at the University of Delaware in Newark. His thesis was entitled: "Renatured Chitin as a New Marine Resource." . . . DENNIS J. DAVOREN works for the Exxon Chemical Co. of Linden, N.J. as an engineer in the technology division.

... JOHN R. FERRARO has been promoted to associate engineer in the transmission and substation engineering department at Northeast Utilities in Berlin, Conn. He joined the firm in 1972 as an assistant engineer. . . . HENRY J. GREENE received his MS in mathematics from Wichita (Kansas) State University in May.

JIM HALL entered Harvard Business School in September. . . . DAVID B. HORROCKS serves as an environmental facilities engineer at Texas Instruments, Inc., Attleboro, Mass. Recently he received his MS in urban-environmental studies from Rensselaer Polytechnic Institute. . . . ROBERT B. KELLEHER, Jr. is with GTE Sylvania in Needham, Mass. . . . JAMES V. LACY serves as a member of the technical staff at Bell Telephone Labs., Holmdel, N.J. . . . Dr. JAMES M. PERRY is an assistant professor in computer science at WPI. He received his PhD from the University of Connecticut this year. . . . JOHN ZORABEDIAN, Jr., now a supervisor in the capacitor department of General Electric in Hudson Falls, N.Y., is also studying for his MS in industrial administration at Union College.

1973

Married: RONALD K. BOHLIN and Miss Martha D. Whiteman on August 10, 1974 in Fairfield, Connecticut. Mrs. Bohlin, a special education teacher, graduated from Anna Maria College. Her husband is a data systems design supervisor at American Teleophone & Telegraph Co., White Plains, N.Y. . . . JOHN J. GIZIENSKI, Jr. and Miss Linda D. Corriveau on June 1, 1974 in Manchester, New Hampshire. The bride graduated from Keene State College. The groom is a manufacturing engineer for General Electric Co., Providence, R.I. . . . RICHARD W. GRAHAM to Miss Susan L. Claar in Millis, Massachusetts on June 8. Mrs. Graham, a graduate of the Concord (N.H.) School of Nursing, is employed at Medfield State Hospital. The bridegroom works for New England Telephone Company. . . . WILLIAM E. HENRIES to Miss Diane C. Fiasconaro on July 27, 1974 in Ansonia, Connecticut. Mrs. Henries graduated from Anna Maria College.

Married: DARWIN W. KOVACS, Jr. and Miss Susan R. Ulasik in Norwich, Connecticut on June 22, 1974. The bride is a graduate of Southern Connecticut State College with a degree in elementary education. Mr. Kovacs is a transportation analyst with the New York State Department of Transportation in Albany. . . . THOMAS MIKOLINNAS and Miss Laurie McKinstry on June 1, 1974 in Sterling, Massachusetts. Mrs. Mikolinnas is a graduate of Fitchburg State College. Her husband is a candidate for his master's degree at WPI and works at Power Technologies, Inc., Schenectady, N.Y. . . . DONALD F. MOQUIN and Miss Joyce D. Kasper in Framingham, Massachusetts on May 25. Mrs. Moquin is a senior at Framingham State College. The groom is a transmissions engineer for the New England Power Co., Westboro, Mass. . . . ANDREW C. MURCH to Miss Cynthia A. Heald on July 6, 1974 in Chester Depot, Vermont. The bride, a Becker graduate, is employed by Dr. Samuel Jones, D.O. Her husband is an engineer for the city of Worcester. . . . RICHARD H. PAGE and Miss Linda Mary Della Giustina on July 20, 1974 in West Springfield, Massachusetts. Mrs. Page, who graduated from Westfield State College, teaches first grade. The bridegroom is associated with Stone & Webster Engineering Corporation.

Married: PAUL J. PARULIS and Miss Patricia Ann Hughes on June 16, 1974 in New York. The bride graduated from Fairleigh Dickinson University, Teaneck, N.J. Mr. Parulis is with Richmond Screw Anchor Co., Inc., Forth Worth, Texas. . . . WILLIAM A. RICHARDS to Miss Lisa E. Della Vecchia in Bristol, Connecticut on July 20. The bride attended Hartford Hospital School of Nursing and Central Connecticut State College. Her husband is a scientific software designer at the Superior Electric Company in Bristol. . . . LAURENCE J. SIGLER to Miss Susan N. Coe on May 27, 1974 in Rindge, New Hampshire. Mrs. Sigler, a graduate of Worcester State, owns and operates Susan Coe Dance Arts. She also is employed in the physical therapy department at the Memorial Hospital. The groom currently majors in music at Anna Maria College and works in the grinding machine division at Warner & Swasey Co. . . . RICHARD F. SOCHA and Miss Luanne Neary in East Hartford, Connecticut on May 4, 1974. The bride is a Becker graduate. Her husband is employed by Western Electric Co. in Andover, Mass. . . . NORMAN D. STALLER and Miss Donna M. Jeannotte in Worcester on June 16, 1974. Mrs. Staller graduated from Anna Maria College. The bridegroom is with Polaroid Corp. in Cambridge, Mass.

WILLIAM N. AULT is now working at Co., Worcester. . . . DAVID CIRKA teaches mathematics in the Athol-Royalston (Mass.) Regional School. . . . WILLIAM J. CLOUTIER serves as a support engineer at Stone & Webster in Boston. . . . WILLIAM E. CORMIER works as a research engineer at Mobil Research & Development, Paulsboro, N.J. . . . ALLEN D. CRANE is with New London (Conn.) Laboratory. . . . JAMES M. FOSTER works for General Electric in Schenectady, N.Y. . . . CHARLES W. KAVANAGH is a field engineer at Turner Construction in New York City. . . . ANNE LAFFAN's WPI master's thesis, rewritten as a paper, was accepted for presentation at the Second International Conference on Automatic Pattern Recognition which was held in Copenhagen, Denmark in August. Her thesis was: "A new tool for automatic pattern recognition." She is employed at Honeywell.

1/LT. EDWARD F. MAHER, a biomedical engineer at Brooks AFS, Texas with the Air Force School of Aerospace Medicine, is a member of a highly skilled team which is conducting laser beam experiments. His specialized team identifies eye hazards associated with laser operations and develops adequate safety criteria and protective measures for those working with the laser. . . . KENNETH C. MUCCINO has been named assistant engineer, Electric Operations, in the Connecticut Light and Power Company's Norwalk District operation. He joined the company last year in the electrical engineering department. . . . HIMANSHU V. PANDE is a chemist at Willard India Ltd., New Delhi, India. . . .

ELIZABETH C. POULIN, who was with Stone & Webster in Boston, is now a graduate student in mechanical engineering at WPI's Alden Research Laboratories. . . . ALI SHAFIGH is studying for his MA in electrical engineering at Northeastern University, Boston. . . . JOSEPH F. SIRECI, Jr., SIM, has joined the hand tools division of Litton Industrial Products in New Britain, Conn. where he will be supervisor of manufacturing engineering. Most recently he was chief manufacturing engineer at Reed and Prince Mfg. Co. in Worcester. Previously he was chief engineer at Donahue Industries in Shrewsbury. . . . ROBERT R. WOOD heads Bobby Wood Racing Enterprises in Whitinsville, Mass.

jamesbury

manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves

Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

1974

Married: DUANE R. ARSENAULT to Miss Sandra L. Bolduc on January 11, 1974 in Gardner, Massachusetts. The bride is a receptionist for Dr. Raymond E. Levesque. The bridegroom is with Gem Industries, Inc., Gardner.... WILLIAM M. BLOCK to Miss Mari A. Ryan on June 8 in North Easton, Massachusetts. Mrs. Block attended Anna Maria College in Paxton. . . . TOM H. FIELDSEND and Miss Vondelle Jean Fowler on July 21, 1974 in Hudson, Massachusetts. The bride, who works in the intensive care unit at Memorial Hospital, Worcester, graduated from Framingham (Mass.) Union Hospital School of Nursing. Her husband is affiliated with Burns and Roe, Inc., Oradell, N.J. and is a member of the Professional Engineering Association.... GARY S. HILLS to Miss Ria J. Wijsbeek on June 1, 1974 in Worcester. Mrs. Hills is an artist. The groom is attending graduate school at the University of California in Berkeley.... ALAN C. JUDD to Miss Linda M. Menard on June 8 in Pemberton, New Jersey. Mrs. Judd attended Worcester State College. The bridegroom works at General Electric Co.

Married: CHESTER KOTOWSKI and Miss Donna L. Conti on June 8, 1974 in Dudley, Massachusetts. The bride is a registered nurse. The groom is with duPont deNemours Co., Kinston, N.C.... DENNIS M. LIBERIS to Miss Barbara A. Bisceglia on January 19, 1974 in Worcester. Mrs. Liberis is employed by Wachusett Molding Co., West Boylston. Her husband is with Astra Pharmaceutical Products, Inc.... JOHN R. MARTIN and Miss April Ann Bliss of Copake, New York on March 30, 1974. He is with Monsanto Co., Indian Orchard, Mass. . . . MICHAEL S. MARTOWSKA and Miss Maureen M. Murray on August 10 in Windsor, Connecticut. The bride attended Annhurst College, Woodstock, Conn. The groom is a teaching assistant at the University of Maryland in College Park.

Married: TIMOTHY F. MURRAY and Miss Kathleen M. Golden on August 3, 1974 in Manchester, Connecticut. Mrs. Murray is a teacher. Her husband is studying for his PhD in chemistry at Princeton University.... JOHN E. O'CONNELL to Miss Martha S. Harte on June 29 in Framingham, Massachusetts. The bride attended Framingham State College and works for Oral Surgical Associates. The bridegroom is a graduate student at Harvard University. . . . GARY G. PONTBRIAND and Miss Susan M. Lockhart on June 15, 1974 in Charlton, Massachusetts. Mrs. Pontbriand graduated from Charlton High School. Her husband is a management engineer with Bethlehem Steel Corporation. . . . STEPHEN N. THIBODEAU and Miss Linda A. Pearson on June 15 in Worcester. The bride, a registered nurse, is employed by Central Massachusetts Rehabilitation Center. The groom is a consulting engineer at St. Vincent Hospital. . . . GARY J. VELOZO and Miss Jacqualyn A. Little on June 9, 1974 in Spencer, Massachusetts. Mrs. Velozo attended Anna Maria and will continue studying at the University of Delaware. Her husband is with DuPont Co., Wilmington.

SUBHASH BAJAJ is a forge engineer for General Electric in Rutland, Vt.... GARRY P. BALBONI works as a construction project management supervisor at the Perini Corp., Framingham, Mass. . . . DAVIS BALESTRACCI, Jr., is with the department of chemical engineering at the University of Minnesota in Minneapolis. . . . KENNETH E. BARNES is an associate staff member at Johns Hopkins University (applied physics lab.) in Silver Spring, Md. . . . ALBERT E. BARRETT, Jr. has been employed by Pratt & Whitney Aircraft Co., electronics department, East Hartford, Conn.... ROBERT L. BARRY works at IBM Corp., East Fishkill, N.Y. . . . BRUCE R. BEAUPRE is with BASF Wyandotte Corporation, Wyandotte, Mich.

MICHEL R. BENOIT works as a process engineer at Pfizer, Inc., Groton, Conn. . . . CLAYTON E. BOYCE is an assistant office engineer at Ebasco Services, Inc., Houston, Texas. Presently he is stationed at Cedar Bayou Generating Station of Houston Lighting and Power Company. . . . JAMES M. BRIGGS is with the Naval Facilities Engineering Command in Philadelphia, Pa.... ROGER J. BROEKER, Jr. works for Catalytic, Inc., Philadelphia....THOMAS I. BURNS has been selected to serve as the 62d field secretary of the International Fraternity of Phi Gamma Delta for a two-year period. The fraternity, which is represented on 104 campuses in the U.S. and Canada, has a living membership of over 71,000. . . . GARY CARVER has been accepted for graduate study at the University of Arizona where he will be an assistant at the Science Optical Laboratory.

DAVID A. CASTELLI works for Xerox Corporation, Webster, N.Y.... CHUAN J. CHEN is a graduate student studying under the Macromolecular Science Program at the Institute of Science and Technology at the University of Michigan in Ann Arbor.... JOHN D. CHIPMAN is employed by GTE Sylvania in Needham, Mass. as an electronic instrumentation engineer. . . . DAVID J. COURTEMANCE works for United Engineers and Constructors, Boston.... GENE E. DeJACKOME is with Monsanto Co., Indian Orchard, Mass. . . . DAVID P. DEMERS has been employed by Firepro, Inc., Wellesley Hills, Mass.... JOSEPH T. FORAND is a graduate student in the chemistry department at Yale University, New Haven, Conn. . . . THOMAS L. GARABEDIAN has joined the Babcock & Wilcox Company's power generation group and is in the initial phase of a company-wide orientation program. He will be assigned to the fossil power generation division. Babcock & Wilcox is an international supplier of energy systems, engineered materials, and industrial automation systems for utility, industrial, commercial, marine and government applications.

DAVID A. GERTH is a graduate student at Tuck Business School, Dartmouth College, Hanover, N.H. . . . H. EDWARD GOETSCH works for the propulsion control systems group at Hamilton Standard Co., Windsor Locks, Conn.... GARY GOLNIK is at the Institute of Optics, University of Rochester (N.Y.) ... IRENE B. JORDAN has been employed at the Badger Co., a Raytheon Co. subsidiary, in Cambridge, Mass.... DAVID S. KORZEC has accepted a field engineering position with General Electric's Installation & Service Engineering Operations, Schenectady, N.Y. He is a member of the American Society of Mechanical Engineers. . . . SCOTT A. LePAGE is with General Electric, mechanical drive turbine department, Fitchburg, Mass.... RICHARD P. LUDORF works with the electric power engineering department at RPI, Troy, N.Y. . . . Automation Industries, Danbury, Conn., has employed DONN M. MATTESON. ... HAROLD L. MAXSON has accepted a position with Charmin Paper Company, Mehoopany, Pa.

HUGH A. McADAM III is employed by the International Paper Box Machine Company in Nashua, N.H. . . . JOHN MICHOPOULOS works for Stone & Webster, Boston, Mass.... WILLIAM H. MURWIN is with the computer division of the State Mutual Life Assurance Company of America in Worcester.... RUSSELL B. NABER serves as a chemical engineer in the food products research department at Procter & Gamble Co., Cincinnati, Ohio.... CHARLES R. NICKERSON has a graduate assistantship in research. He is working at the Woods Hole Oceanographic Institution and also has a grant funded by the Office of Naval Research at WPI.... MARK E. OSTERGREN has been assigned to the fossil power generation division at Babcock & Wilcox, Barberton, Ohio.... THOMAS J. SOCHA recently accepted a position in industrial engineering with Mercury Wire Products in Worcester.... DAVID STEINER has joined W. R. Grace & Co., an engineering firm in Cambridge, Mass. . . . DAVID R. WASHBURN works for the United States Naval Civil Engineering Division in Philadelphia.... MICHAEL GRAHAM is an assistant in the Industrial Relations Department at Albany International, Albany, N.Y.... ANTHONY TRIPOLI works for General Electric in Waterford, N.Y.

HENRY C. WALTER, '00, of Fort Myers, Florida, a former instructor of electrical engineering at WPI, died on June 4, 1974 at the age of 97.

He was born on October 27, 1876 in Washington, D.C. After graduating as an electrical engineer from WPI, he went with General Electric in Schenectady and then taught at North Carolina State A & M College and Purdue University. As an instructor at WPI from 1904 to 1906, he designed the test equipment in the EE laboratory. Later he worked for Westinghouse Electric Co., Allis Chalmers Mfg. Co., Fairbanks Morse, and Calco Chemical Co. In 1946 he retired as a design engineer from Crocker-Wheeler Co.

Mr. Walter, who took up sailing at the age of 77, had sailed his 30-foot sloop to Cuba. He was a world traveler and made a camping trip through Europe when he was 93. A year later he visited London. He made his first trip to Europe in 1895.

He was a life member of AIEE and the father of James S. Walter, '40. He was considered to be the oldest living member of Phi Gamma Delta Fraternity.

JOSEPH W. ROGERS, '01, died in West Brookfield, Massachusetts on June 10, 1974 at the age of 98.

A native of Hyde Park, Mass., he studied at WPI and graduated as an electrical engineer in 1901. After spending a year in the General Electric test department in Lynn, Mass., he joined the Pennsylvania Railroad where he retired as an assistant power director in 1938.

He was a life-member of the Barre (Mass.) Historical Society.

WALLACE L. FLAGG, '08, of Oroville, California died on February 9, 1974.

He was born on October 1, 1886 at Littleton, Mass. After studying at WPI, he became associated with Cambia Steel Co., the Chicago & Northwestern R.R., W.H. Schott Co., Chicago, and the Cadillac Motor Car Co., Detroit. In later years he was self-employed.

He belonged to Delta Tau, now Sigma Phi Epsilon fraternity.

MOSES H. TEAZE, '17, philanthropist and a retired partner in the consulting engineering firm of H. S. Ferguson & Co., died in Norwalk, Connecticut on June 23, 1974.

He was born on January 26, 1889 in Middletown, Rhode Island and graduated with a civil engineering degree from WPI in 1917. During his lifetime he was associated with Westinghouse, Stone & Webster Engineering Corp., and Great Northern Paper Co. In 1948 he retired as a partner in H. S. Ferguson & Co. (New York City), after 30 years of service.

Mr. Teaze, who belonged to ATO, Skull, Tau Beta Pi and Sigma Xi, was a life member of ASME, ASCE, American Ordnance Association, American Association for the Advancement of Science and the Engineering Institute of Canada.

He also served as past president of the Mountainside Hospital, Montclair, N.J., vice president of the New Jersey Hospital Association, and past president of the Westport-Weston (Conn.) Chapter of the American Red Cross. He was a founder of the Mid-Fairfield County Youth Museum and a lifelong member of the Weston Historical Association.

WENDELL B. BATTEN, '22, passed away in Pittsburgh, Pennsylvania on June 30, 1974. He was 75.

A retired electrical engineer for the Westinghouse Corp. in East Pittsburgh, he was born on April 25, 1899 in Hardwick, Vt. He joined Westinghouse in 1922 and was section manager of the high power section in the engineering laboratories.

Mr. Batten belonged to AIEE, Tau Beta Pi, and Sigma Xi.

HOWARD P. PUTNAM, '23, of Woodstown, New Jersey, died of a stroke on July 20, 1974.

He was born on June 21, 1900 in Worcester. In 1923 he graduated as a mechnical engineer from WPI. Following graduation he joined Westinghouse Electric Corp. as a cadet engineer for a year. From 1924 until 1943 he was a field engineer for the Bell Telephone Co. of Pennsylvania. Later he became a partner in the Cottage Tea House in Bryn Mawr, Pa.

Mr. Putnam belonged to the Main Line Chamber of Commerce, Rotary International, the Philadelphia Restaurant Association, Phi Gamma Delta and Skull.

FREDERIC V. HASKELL, '26, passed away on August 4, 1974 in Gladstone, New Jersey. He was 71.

Born in Worcester on June 1, 1903, he later graduated as an electrical engineer from WPI. After working for New York Edison Co., he joined Bell Labs in 1929 and for 25 years worked on the development of aerial cables and open wire systems. He was the holder of three patents on outside plant methods and tools. Before retiring in 1968 with 38 years of service, he developed improved methods of installing telephone equipment between the central office and the subscriber.

Mr. Haskell was a senior member of the Institute of Electrical and Electronics Engineers and a former member of the planning board in Gladstone, N.J. He belonged to Sigma Phi Epsilon.

GEORGE H. FINLAY, '28, of Towson, Maryland, died suddenly on August 13, 1974.

Born in Clinton, Mass. on December 30, 1906, he later studied mechanical engineering at WPI and graduated in 1928. From 1928 until 1946 he worked his way up from an inspector to executive assistant at the Factory Insurance Association in Hartford, Conn. Later he was a general adjuster with Alexander & Alexander, Inc., Baltimore, Md.

He was a member of Theta Chi, the Maryland and national Society of Professional Engineers and the Baltimore Insurance Adjusters Association. A past president of the Philadelphia chapter of the Alumni Association, he was also the father of William F. Finlay, '54.

ELMER L. TAYLOR, '28, a former supervisory engineer and world-wide consultant for Norton Co., died in Clinton, Massachusetts on July 1.

He was born on June 9, 1907 in Peacham, Vt. In 1928 he received his BSEE from WPI and joined Norton Co., Worcester. In 1931 he became foreman for Norton Grinding Wheel Co., Ltd., in England. Later he was a laboratory chief for Norton in France and then a supervisor and a consultant in West Germany.

Mr. Taylor belonged to Tau Beta Pi and Sigma Xi. A former selectman in Lancaster, Mass., he was a member of the town's finance committee.

GORDON B. GEORGE, '32, of Shrewsbury, Massachusetts, passed away on July 15, 1974.

Born on February 18, 1908 at Westboro, Mass., he was later a student at WPI. For several years he was a supervisor at Lyman School for Boys in Westboro. At one time he was head of the science department at Saugus (Mass.) High School. He belonged to Theta Chi Fraternity.

JOHN W. GREENE, '32, executive secretary of the Central Massachusetts Chapter of the National Safety Council, died May 31, 1974 in Holden, Massachusetts at the age of 63.

He was a special adviser on highway safety to former governor, John A. Volpe. A mathematics teacher, he was also a physicist, a producer of educational films and a musician. He was a professional organist and had owned and developed Worcester's first piped-in music system. He had also helped operate the former Red Barn Theater and Lounge in Westboro.

Mr. Greene, a general science graduate from WPI, was appointed manager of the Worcester Safety Council in 1948. He also served as secretary and member of the city manager's committee on traffic safety. A native of West Boylston, Mass., he was a past public relations director of the Worcester Area Chamber of Commerce, an instructor at Classical and South high schools and Worcester Junior College. From 1943 until 1946 he was a physicist in magnetic mine warfare at Philadelphia Navy Yard.

He belonged to the American Society of Safety Engineers, the Worcester Musicians' Association, and served as assistant director of the Worcester Natural History Museum and as director of the Worcester Evening Adult School.

GORDON E. BARNES, '33, of Reading, Massachusetts, died suddenly at work on January 10, 1974. He was 64.

He was a native of Hardwick, Mass. and an electrical engineering graduate from WPI. During his career he was with San-Nap-Pack Mfg., Co., Eastern Oil Co., American Steel & Wire Co., Eastern Gas & Fuel Associates of Everett, Mass. and the Boston Gas Co. He was a registered professional engineer in Massachusetts and a member of Theta Chi Fraternity.

GEORGE V. UIHLEIN, Jr., '45, dean of men at Loyola College, Montreal, Canada, died on June 23, 1974. He was 49.

After graduating from WPI as a chemist in 1945, he served as a chemical engineer in the Naval Ordnance Laboratories, Washington, D.C. From 1945 to 1947 he was an instructor at WPI. Later be became executive director of Phi Kappa Theta Fraternity, an account executive with Hanrahan and Co., and vice president of Bay State Savings Bank, Worcester.

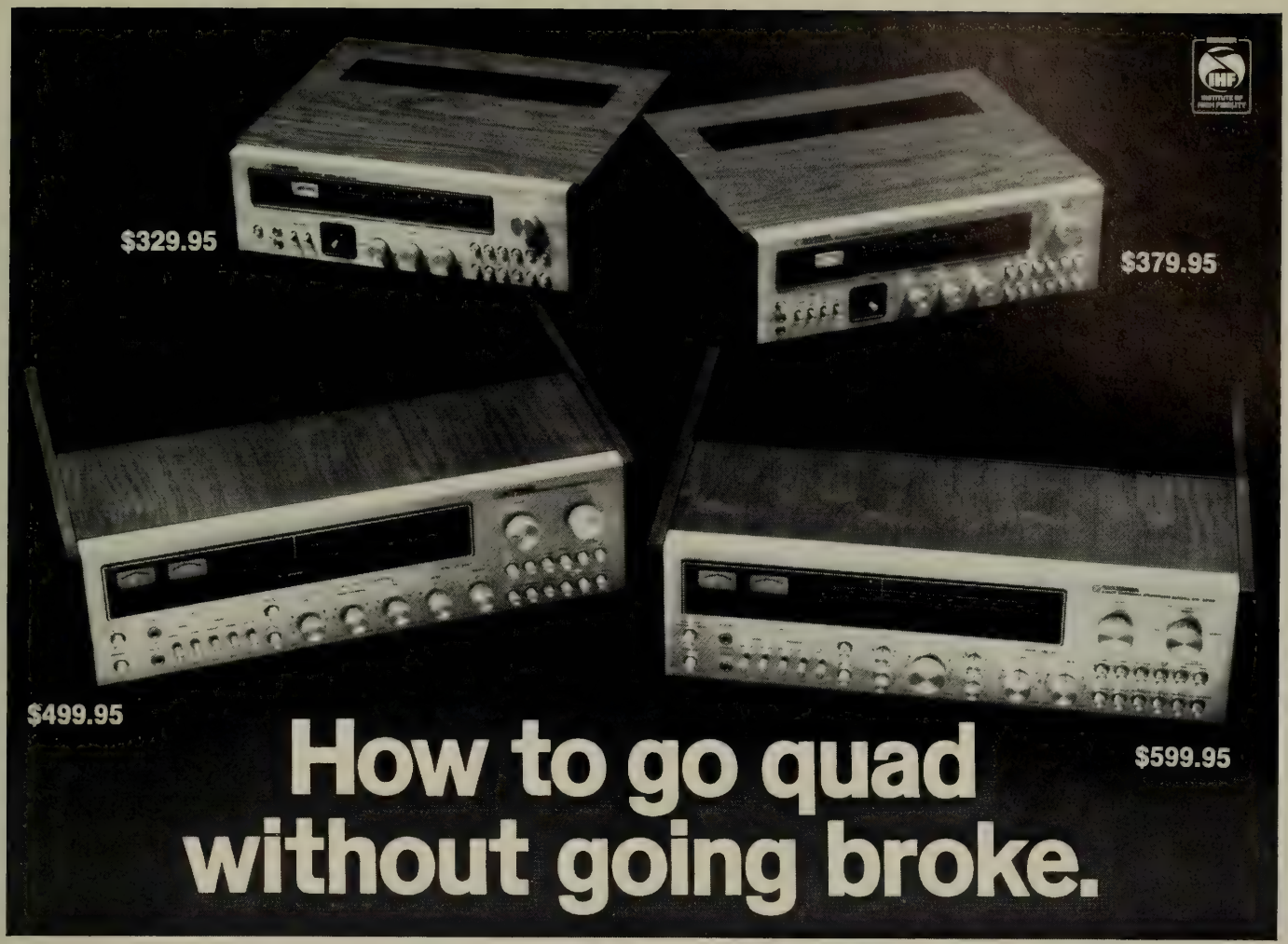
He was born on Sept. 2, 1924 in Mountain View, N.J. In 1947 he received his MS from WPI. While an executive with Phi Kappa Theta, he established its headquarters in Worcester. In May he was awarded the distinguished service award of Phi Kappa Theta Fraternity.

Mr. Uihlein was elected national president of the College Fraternity Secretaries Association and president of Phi Kappa Theta's International Education Foundation. He belonged to the American Chemical Society, Sigma Xi, Tau Beta Pi, Pi Delta Epsilon, and the Canadian Association for Student Affairs.

WILLIAM F. HEINZ, '66, was killed on June 14, 1974 in Penacook, New Hampshire when his motorcycle skidded into a tree. He was 39.

He was born on May 21, 1935 in New Haven, Conn. and graduated from WPI with a master's degree in 1966. A physics teacher at Concord (N.H.) High School, he had also received a degree from Plymouth State College.

Mr. Heinz, who was a member of the State Golfers Association, was a city golf champion. He belonged to the National Physicist Association, the Concord Teachers Association, the Athletics Association and taught driver education.



How to go quad without going broke.

The trick is to find a high-quality quad receiver at a low price.

We think we have that receiver. In fact, we think we have four of them, each one an outstanding buy within its price category. They're all listed below with their prices and most important specs. All you have to do is decide which one is best for you.

$329.95* 4 x 7.5 watts continuous (RMS) power into 8 ohms from 30Hz to 20kHz at less than 1% total harmonic distortion. 2 x 15 watts continuous (RMS) power in special stereo bridge mode. IM distortion at rated continuous output is less than 1%. Frequency response is 20Hz-20kHz at tape input ± 1.5 db. An exceptional FM sensitivity of 2.3 μv. Plus many features. Model RQ 3745.

$379.95* 4 x 15 watts continuous (RMS) power into 8 ohms from 20 Hz to 20kHz at less than 1% total harmonic distortion. 2 x 30 watts continuous (RMS) power in special stereo bridge mode. IM distortion at rated continuous output is less than 1%. Frequency response is 20Hz-20kHz at tape input ± 1.5db. FM sensitivity of 2.3 μv. Plus many features. Model RQ 3746.

$499.95* 4 x 25 watts continuous (RMS) power into 8 ohms from 20Hz to 20kHz at less than 0.5% total harmonic distortion. 2 x 60 watts continuous (RMS) power in special stereo bridge mode. IM distortion at rated continuous output is less than 0.5%. Frequency response is 20Hz to 30kHz at tape input ± 1.5db. FM sensitivity is an exceptional 1.9 μv. Full function jack panel. Walnut veneer cabinet. Plus many other features. Model RQ 3747.

$599.95* 4 x 50 watts continuous (RMS) power into 8 ohms from 20Hz to 20kHz at less than 0.5% total harmonic distortion. 2 x 125 watts continuous (RMS) power in special stereo bridge mode. IM distortion at rated continuous output is less than 0.5%. Frequency response is 20Hz to 30kHz at tape input ± 1.5db. Outstanding FM sensitivity of 1.9 μv. Full function jack panel. Walnut veneer cabinet. Plus many other features. Model RQ 3748.

If you like what you see and what you read, go to your Sylvania dealer. When you're there, you'll like what you hear.

*Manufacturer's suggested retail price.

GTE SYLVANIA

DECEMBER 1974

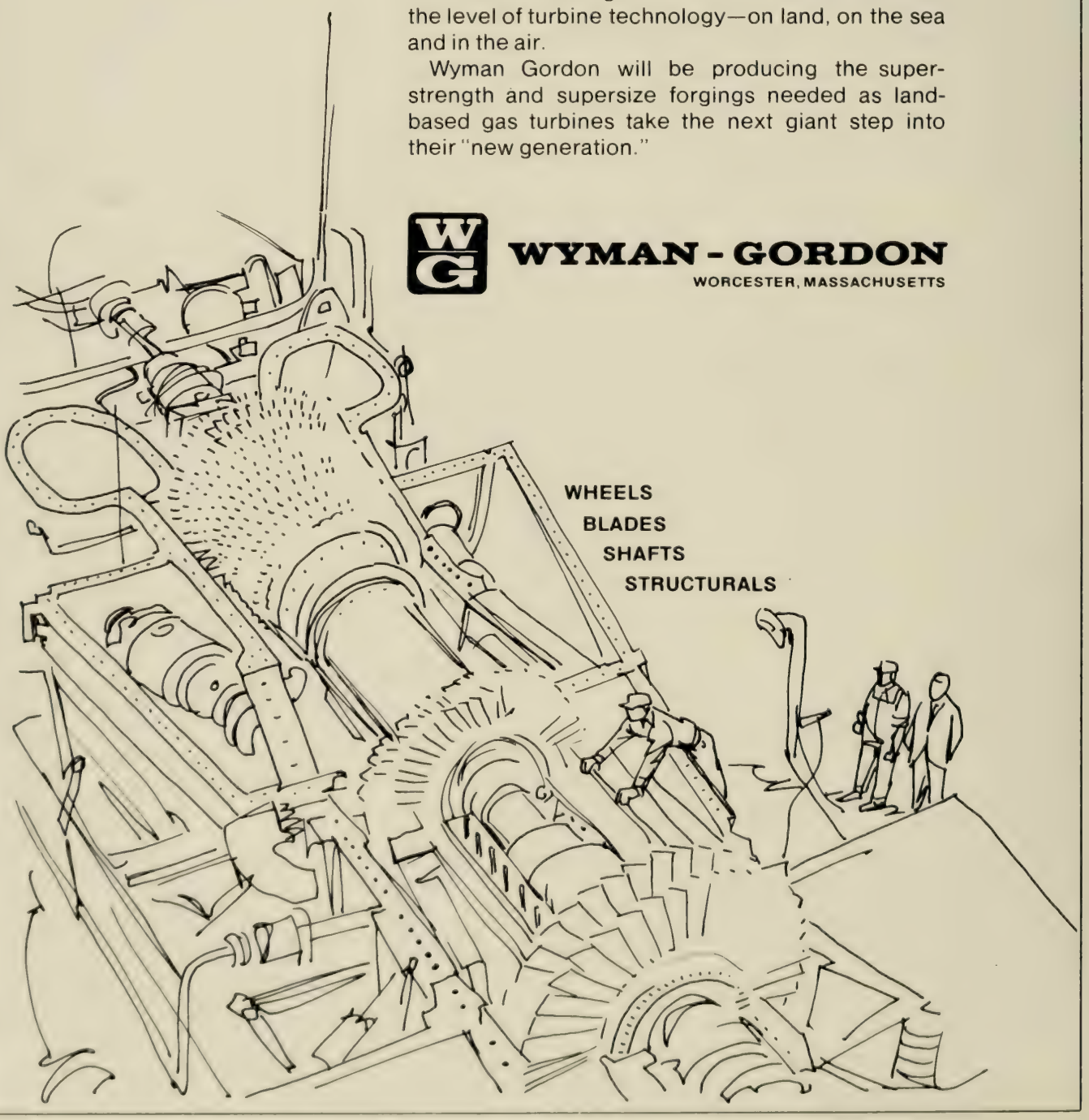
WPI journal

Forging for the new generation of turbine engines

Wyman Gordon's mechanical/metallurgical skills have allowed designers and fabricators to stretch the level of turbine technology—on land, on the sea and in the air.

Wyman Gordon will be producing the super-strength and supersize forgings needed as land-based gas turbines take the next giant step into their "new generation."

WYMAN-GORDON
WORCESTER, MASSACHUSETTS



WPI journal

Vol. 78, No. 4 December 1974

2 On the hill
The Pub gets a home at last

4 When WPI plays Bowdoin, it's a family affair
One Saturday afternoon of small-college football in New England, as viewed by Jack Tubert of the *Worcester Telegram*

6 Five years later
President George Hazzard examines WPI in mid-Plan and concludes that while the Institute has come a long way in a short time, there are still many things left to do

14 Coombsie
Charles Keyser, '39, reminisces about one of WPI's more colorful faculty members of times gone by

16 Up in the air, Junior Birdmen
Bob Goodness, '70, likes to fly, but not in airplanes

20 You went to an engineering school, so you're an engineer, right? Wrong.
Rugh Trask profiles five alumni who ultimately chose not to go into engineering careers

23 Your class and others

25 What you need is a left-handed skyhook
An alumnus makes those old jokes come true

31 Completed careers

The cover: Hang-gliding off the Cape Cod dunes; photograph by John F. Wellsman

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, *chairman;* Donald F. Berth, '56; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography: Typesetting Service, Providence, Rhode Island

Printing: Davis Press, Worcester, Massachusetts

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1974 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster:* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI Alumni Association

President: W. J. Bank, '46

Vice President: F. S. Harvey, '37; W. A. Julian, '49

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr. '44

Executive Committee Members-at-large: B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55; L. Polizzotto, '70

Fund Board: W. J. Charow, '49, *chairman;* L. H. White, '41; G. A. Anderson, '51; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

by the editor

The Pub gets a home at last

The Goat's Head Pub, wall to wall with first-nighters, opened officially on August 31st. Hundreds of invited guests poured into Sanford Riley for the grand opening. Most were unprepared for what they found: barn board walls, "brick" flooring, brass chandeliers, long wooden booths, and captain's chairs. Some were unprepared for the decor, which included a solemn, gilded cherub in a cocked hat presiding over the back bar.

"What, no nude?" cracked one guest.

"No goat's head either," quipped another.

"No matter," said a woman student. "The place is clean and it's got atmosphere. Count your blessings."

"There's even live entertainment in the Coffee House," she remarked. "It looks like they've finally got this place together."

It wasn't easy getting the Pub together, but this summer it happened.

Chartered in 1968, the Pub, in various stages of repair and disrepair, had been shuttled between the lower levels of Sanford Riley like a forgotten stepchild. The founders, Joel S. Schoenholtz and James A. Raslavsky, both '68, and the incorporators, Dean William Grogan, '46, Prof. Richard Olson, '54, Dean William Trask, Prof. John Boyd, Prof. Thaddeus Roddenbery, Dean Roy Seaberg, '56, and Dean Bernard Brown, looked forward to the day when the Pub would have a permanent home and an adequate budget. They envisioned it as a prime after-hours meeting spot for everyone on campus – a place for students to get to know one another, as well as faculty members, staff, and alumni, all in a friendly, informal atmosphere. They also hoped that parents would feel free to utilize the area as a kind of welcome room.

Back in '67 the Pub started out as a modest rathskeller in a dark, cramped room in the basement of Sanford Riley. It was open two days a week for students 21 and over, as well as for faculty members. This year the WPI administration gave permission to move the Pub up one floor into the larger area which had been the kitchen and dining hall that originally served the entire campus.

When the legal drinking age dropped to 18, the whole operation got out of hand.

"We had to expand and remodel," says Jon Wyman, '75, who coordinated the construction job this summer. "We were bursting at the seams."

Besides, the atmosphere was anything but inviting. Broken green plaster covered the dingy white floor of the former 30′ x 60′ kitchen-snack bar.

"Transforming this particular room was our most difficult job," says Prof. "Ollie" Olson, who is a board member of the pub and works with the management. "We got ideas from the Class of 1974's concerned Committee of 13. Together we drew up several sets of plans and decided to use the least expensive one," he continues.

In the end the renovations cost about $15,000, with $7,000 coming from student funds and the rest provided by the college administration.

Now the main pub room sports a rich-looking wood-grain bar, red "brick" floor, a color TV, coordinated furniture obtained through the cooperation of Julius Palley, '46, and brass chandeliers salvaged from the old faculty dining room. For security reasons all the windows were barred.

"The students did over 90 percent of the work themselves," says Craig Lazenby, '71 who did much of the finishing and directed the installation of the paneling and built-in booths. "The only professional help was with the bar top, flooring, and electrical wiring. Some of the secretaries pitched in with the painting and the cleaning."

Local liquor distributors assisted with the decor by contributing colorful signs, lights, and wall hangings.

The Coffee House, which adjoins the Goat's Head Pub, also underwent a transformation, at least a modest one. Solid, old partitions were torn down. ("A mean job," says Jon Wyman. "They were heavily braced and nailed to the floor.") Now the whole 40′ x 80′ area is wide open.

"Paul O'Brien, '75 and John Scott, '76 are responsible for patching and refinishing the wood floor," Prof. Olson says. "I don't think that it ever looked better than it does now."

On one side of the Coffee House is a stage for live entertainment which is featured at least one day a week. Also featured are movie classics, all the way from W. C. Fields to Humphrey Bogart.

"We're really in business now," grins Prof. Olson, who has plenty to grin about these days. "We're doing three times the business we did last year at this time. In September alone we grossed $10,000."

And the students? Many of the 20 or so who voluntered their services during the renovations are now working part-time at the pub as managers, bartenders and bar maids. (Some earned academic credit for supervision, too.) And the rest of the student body, faculty, and increasing numbers of alumni and parents are finding the Goat's Head Pub the most convenient and entertaining place to meet on campus.

Bill Delphos, '74, summed it all up as he breezed in from the Cape on opening night.

"I wouldn't have missed this for anything," he said.

Covers

Through a printing error, the cover for the October *Journal* went unexplained and uncredited. It was a drawing of turbulent water, done by Leonardo da Vinci around 1507. The cover was intended to symbolize on the one hand the controversy swirling around the nuclear power question, and on the other the actual water used in reactor cooling.

When WPI plays Bowdoin, it's a family affair

By Jack Tubert

A DINKY BOX of explosive caps from a toy cowboy gun. Pow Pow! Pow! Stretched out like bumpy, red postage stamps on the curbstone. Two small boys smashing the caps against the granite with a rock – powpowpow.

That was the thunder of Bowdoin College's football victory over Worcester Tech at Alumni Field.

Nothing big time

No roll of drums.

New England small college football is a family affair.

Fun in the sun on the rolling greensward in the tree-shaded valley where Route 12 (Park Avenue) runs between Bancroft Tower and the campus on Boynton Hill. The bridal-white steeple atop First Baptist Church, seeming to split the north goalpost in its climb to the skies, adding a country feeling to the city setting.

Bob Aubrey's field goal attempt failed to split the south goalpost in the final 30 seconds for a Tech victory. Bowdoin triumphed, 17-15.

It was hard to tell the winners from the losers as the field quickly emptied. (Bowdoin's garb was bad guy black, and the local Engineers wore good guy white.) But, everyone was smiling. Shaking hands.

Unlike the crowds who leave concrete bowls where big-time college football is played to seek fun at sophisticated cocktail lounges, fans filing out of the wooden stands at Tech Field seemed content to be heading home.

After the ball, where do you go?

"We're going directly home," said John Clemens, who faced a long drive to Reading. "My son Paul is a linebacker with Bowdoin," said the white-haired Clemens, en route to get the family car when he stopped to watch Aubrey's decisive boot.

"Like everyone else, we're going home to talk over the game," said Pat Scavone, son of a fabled athlete of another era, Worcester contractor Jimmy Scavone, and brother to Tech's Timmy Scavone.

Pat leaned down to ask his own little boy, Patrick Scavone Jr., "Who won the game?" The answer: "Timmy."

"Naw, we didn't win," said Papa Pat, "but it was a good game, and that field goal was a good call."

No Pressure

Surrounded by his offspring in leaving the field, Jimmy Scavone said it had been a great afternoon of good football. A nice, relaxing switch from directing his giant earthmoving equipment daily in carving Route 52 out of the woods and rocks of Oxford.

"There's no pressure in this league," said Pat Scavone, a former UMass athlete. "These kids play football because they like to play."

"We're going to get pizzas," popped Edwin (Ted) Coghlin Jr., Tech '56, as was his dad, Tech '23 and his grandfather, Tech '93. Kids, dogs, neighbors. Going to get pizza pies and then home to talk about the game.

Bruce Maillet, Coghlin's Shrewsbury neighbor, is scout master for Cub Scout Pack 258. "We just climbed Mount Wachusett before the game with 45 kids and 12 adults," Coghlin explained; Maillet adding, "And, those who made it back down the mountain are here at the game."

A third neighbor, Gerry Bedard, walked with Coghlin and Maillet in leaving the gridiron where a gang of schoolboys now gamboled.

"The last two minutes of today's game," Bedard said "was the same as watching Buffalo and Oakland (pro teams), as exciting as watching them on television . . . Tech came down the field, trying to pull it out . . . it was something." "Super football," said Coghlin. "Hell of a finish." Maillet agreed.

On the Tech campus, high above the football field, people chatted with friends before driving away in cars. Kids and dogs chased the same football. Raindrops started falling, short-circuited a bit of post-game tailgating by some families who picnic in the parking lot at games.

Putting away a burner and other cooking utensils, Mark Smith of Pleasantville, N.Y., an international operations officer with the First National Bank of New York City, beamed, "After the game, I drink beer and the others drink tea."

We either drink to celebrate or to drown our sorrows," laughed his wife, adding, "It doesn't make a whole lot of difference!" She was celebrating yesterday. Her husband is Bowdoin '58.

Reprinted from the *Worcester Sunday Telegram,* copyright 1974, The Worcester Telegram & Gazette.

The Robert Kingsbury family from Bedford was tailgating at the next car. Mrs. Kingsbury was putting away the last "hot hero sandwiches – meatballs," and everyone was still praising her long-gone cherry-tomato dip and other pre-game delicacies. Her husband, too, was Bowdoin '58.

A 'Fun' Experience

"For 16 years we've been doing this – going to football games together. Four games each season," Mrs. Smith explained, while the smiling Mrs. Kingsbury ticked off the Bowdoin games they'd see this year and explaining how they'd already planned what games to drive to in 1975.

"This is just wonderful," said banker Smith, sipping on a beer. "I hate the big city. We live 35 miles outside New York, and Worcester is just like Pleasantville. We come here for the football. This is New England small college football. It's more fun than anything else."

"Where else could you let your children run wild?" asked one of the women, watching offspring, nephews and nieces gambol in the grass.

Tech students either returned to dorms to study, or visited with friends and relatives in the Goat's Head Pub in the cellar of Sanford Riley Hall. Lambrusco and Chablis wines, beer and Coke sales were brisk as coed and collegians discussed the game – or watched surfboarding on television.

"We'll probably stay here until dinner and go out to a Chinese restaurant," said Anne McPartland of Houlton, Maine, a Tech student and cheerleader.

"She says Chinese food, I guess that's it" laughed Charles Dodd of Norwalk, Conn., a '74 WPI grad.

"It would be McDonald's, but we've had a lot of hamburg in the cafeteria lately," the cheerleader explained.

Suitcase College

"It's a suitcase college, you know, the kids go home weekends," explained Paul Frederickson of New Jersey, a Tech junior with a pack of Marlboro's rolled into the sleeve of his T-shirt, just like the 1950s.

"I design the T-shirts," said Frederickson, showing the Goat's Head emblem on his back. "He also designed and built the pub," a classmate added.

Students, alumni, dates and mates started a serious discussion of Tech's setback. "We've got a strong defense, but we've got to get away from those off-tackle plays and pass more," said one youth, lifting a plastic cup of beer up high to gain a thousand cheers.

Outside the powpowpow of explosive caps. Justin Shay, 11, of Carlisle and his brother, Jeffrey, 8, exploded the caps, as six-year-old Jennifer Smith, daughter of the New York banker watched fascinated, but frightened by the sound – powpowpow.

Jennifer brought a Barbie doll to the game. Her name? "Dawn, but I like football better than dolls," said the girl and the little boys laughed with glee, pounding rocks against the caps – Pow! Pow! Pow!

WPI

Five years later

by Dr. George W. Hazzard, president

THIS FIVE YEAR REPORT is self-imposed. No one asked for it. Perhaps no one wishes to hear it. But only in a self-conscious look at our own immediate history can we get possible glimpses of the future. And only by a historical look can we see the enormity of the effort occurring at WPI.

Many years ago I was struck by a description of quantum mechanics and its pivotal role in understanding the physical world. In effect, that description said that ordinary classical mechanics described a man's life in terms of dates, houses lived in, actions taken, people known – ordinary history, one might say. Quantum mechanics described that same life in terms of motivations, interactive situations, thoughts, internal personal forces – psychological history, perhaps.

So I have written two reports: the classical one and the quantum mechanical one. The classical one is publishable and for the history books, so to speak. But the other one, the real WPI, is so evanescent, so prone to disappear just as you grasp it, that I can only try to give you glimpses of our internal reality.

WPI has undergone a revolution. It may have been quiet and bloodless; but it was not gutless. Nowhere in this country has any educational institution stopped, looked at itself, decided to turn inside out, and then done so. Nowhere in this country has such a thing been done without absolutely rending crises, wars, and name-calling. Nowhere in this country is there such an opportunity for educational leadership than here.

The WPI Plan *is* the past five years. It *is* the Planning Committee. It *is* the vehicle for more student writing and talking about educational process than you can find elsewhere. It *is* faculty working 80 to 100 hours per week. It *is* administrators doing likewise. It *is* tension, skepticism, exhilaration, frustration, incredible detail, patience, and great hope. What you have gotten from all of us at WPI in the past five years, money can't buy.

The WPI Plan is our future. It is constant concern for the learning process, for career preparation of the most fundamental and personal kind, for teachers and students as people who must grow together, for adaptation of technique without relinquishing basic goals. It is sharing ideas with others while simultaneously leading and growing in the education of all those with a basically quantitative turn of mind. It is a melding of the great ideas of mankind in effective areas of human thought with those in scientific areas. It is technological humanism.

The WPI Plan is our present. It is tension between strongly held beliefs about education, between roles for faculty, staff, or administration. It is management for efficiency and effectiveness without mowing down the fragile flowers of personal growth, learning, and humaneness. It is interpreting to and convincing outsiders of our quality of purpose and of process. It is a continuous and demanding search for ways to make all this happen. It is not easy, nor certain, nor ever complete. For it is a body of close to 3000 people with constantly changing composition that must make all this happen.

With that brief quantum mechanical description of WPI, let me now turn to a classical mechanical description. Here I will try to indicate forces and responses, overt changes, and perhaps some ideas for the future. Any report is selective. This one is too, but I do not mean to imply lack of importance of many omitted items, people, or actions. When one tries to cover ten years at an active place like WPI, one is hard pressed to be balanced *and* brief.

I chose ten years because only by looking back that far can one get a good sense about some major changes in economic and social patterns that are critical to the behavior of WPI. For example, consider Figure 1. The data show some of the pressures on WPI. When the national pool of possible students rises by 30% and the enrollment in Massachusetts public higher education by 278%, you know we have a market problem. Couple that with an inflationary rise of 50% vs. a stock market lower than 10 years ago and you know we have a resources problem. Troubled waters in which to fish.

Yet in this same period WPI has experienced major growth in its facilities and activities, as is clearly shown in Figure 2. In the face of the pressures demonstrated in Figure 1, WPI has increased its students by 60%, its faculty by 34%, its tuition rate by 72%, and its building area by 32%. Actually if one removes student housing and related space, WPI facilities have been essentially unchanged since 1968. We have bucked the trends sufficiently long that one wonders, how much longer?

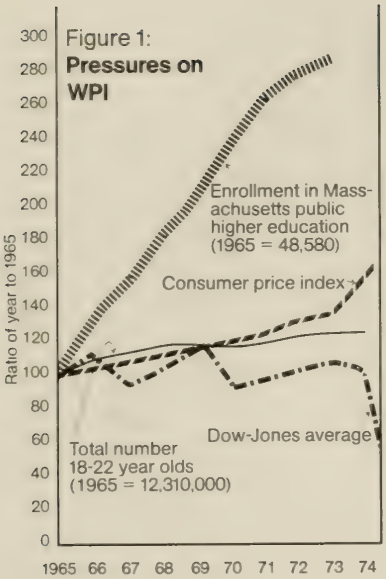
How it has all turned out is reasonably well indicated in Figure 3. What you see is a result that compares favorably with the outside pressures on WPI. We have a net operating result over ten years that is negative by only 1.06% of the total operating budget for that period. That result depended heavily on growth in tuition income. New ways of solving that problem in the future challenge every private institution in the country. The tuition problem is a critical one for WPI. However, had our endowment income grown linearly from 1966 to 1973, our operating result would have been very close to break even.

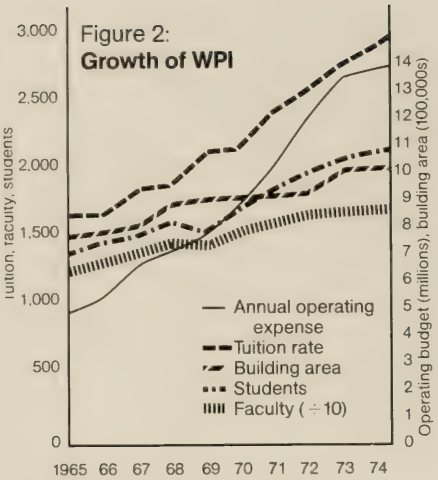
Looking back over the decade I conclude that the first half was one of facilities growth; the second half one of program growth. Both are necessary if WPI is to maintain its reputation for high quality education. How both tie together will be another crucial problem for the future.

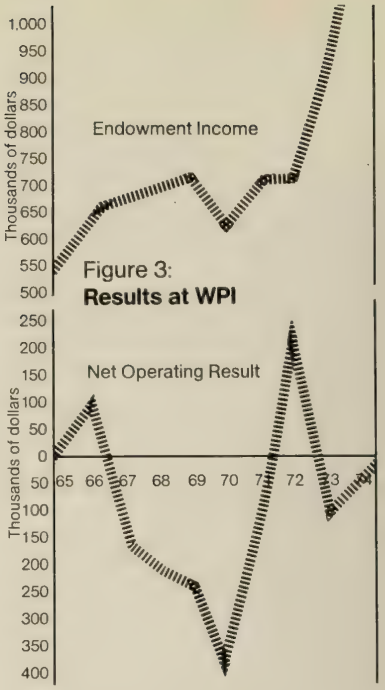
People of WPI

All these graphs and numbers are fine as general indicators of trends. What they do not show are the people that make the numbers and trends real and worthwhile.

For example, the WPI Plan would never have come into existence without the Planning Committe of Professors van Alstyne, Boyd, Grogan, Heventhal, Moruzzi, and Shipman (Weininger and Roadstrum were original members too). All but one are still at WPI and working as hard as ever to assure our success . . . an astonishing fact, but no more so than the







fact that the Plan is being implemented by largely the same faculty that was so conservative and rigid ten years ago. Responding to that fact by helping these faculty grow and change is another challenge we face.

Without reciting all the names, let me indicate the major personnel changes that have occurred in the past five years:

- In General Administration a total of 14 replacements or additions.
- In departmental Administration a total of 8 replacements or additions.
- In faculty we have lost 62 and gained 72.
- And in Trustees we have lost 17 and gained 13 regular and 15 emeriti members.

One can safely say that at WPI the people situation is as dynamic as it is elsewhere in the world. This recital is really intended to emphasize one thing: that we have in place a competent and effective team committed to WPI and its future success.

(Parenthetically, and without any negative implications about others, I must say that Dean William Grogan has been pivotal in bringing the undergraduate program to its present level of success. Without his tremendous and complete involvement we just could not have made it.)

Not less important to a President is the Chairman of his Board of Trustees. No one could have had more supportive and helpful chairmen than I have. First Dr. William Hanson whose academic interest and vision greatly aided the initiation of the WPI Plan. And now Milton Higgins, whose breadth of knowledge of people and social forces is a constant amazement and continuous help. Without his willingness to listen and probe and guide, these past three years would have been much less productive for WPI.

Alumni

No private institution can continue successfully without the strong interest and support of its graduates. WPI is no exception. It has been favored by a strong group of alumni trustees. Their support has been terribly important.

Equally important has been the commitment of the general alumni body. Integrating their volunteer efforts with the college staff's full-time efforts is essential to the success of our programs. It was to these ends that Robert Higgs and then Jim Donahue, as presidents of the Alumni Association, joined us on the hill in creating more formal and closer ties.

In my estimation the results of this close relationship have been all positive. I count it a major success for WPI in the past five years.

Students and Faculty

First, the Students. Talking about students is difficult for a college president. Inevitably it is the nature of things that he deals with the best and the worst. In drawing conclusions one responds to impressions or to fragmentary data. But I do have a sense of relatively greater independence, self-reliance, and sophistication compared to five years ago. Not that WPI students have these qualities in the same degree as students in the Ivy League schools; far from it. But they continue to be fine, goal-oriented, hard-working people whom I find it a pleasure to serve.

Statistically we surely have changed in five years: from 1630 undergraduates enrolled in fall 1968 to 2048 this fall. From 2 women to 133. From 1 black to 30. From 106 to 225 foreign students (especially important is the rise from 31 to 86 foreign undergraduates). But with all this just about half our students still come from Massachusetts.

The numbers have increased, the variety of backgrounds and interests has increased. Our challenge now is a proper balance between increased quality of student and maximum value added in the educational process.

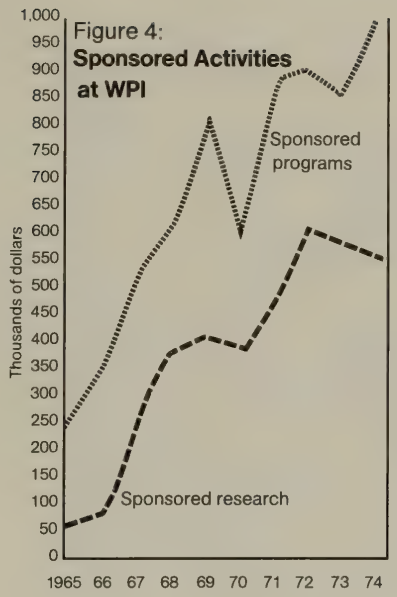
Now, the Faculty. In these days an enrollment growth of 4.5% a year is essentially stability. The resulting stability in number of faculty creates a concern, shared across the country, about the educational and economic effects of a stable and highly tenured faculty. Another problem for the future but one that we are already hard at work to solve.

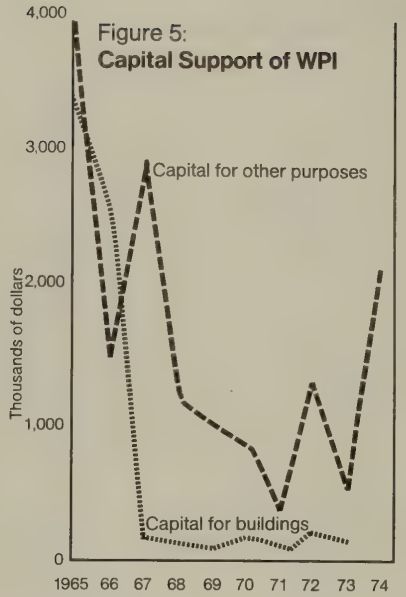
How faculty and administration can work together for the institution is nicely shown by Figure 4. Without these outside sponsored programs I doubt that WPI would have survived as an institution or retained the kind of faculty that gives us pride in our educational process. Let me couple these results (where you can see that the last five years have averaged $852,000 for sponsored programs and $528,000 for sponsored research versus $495,000 and $245,000 for the previous five years) with capital giving to WPI as shown in Figure 5.

You can readily see that we have not been collecting much money for new buildings in the last eight years. And I think you can see from the wild annual gyrations of capital giving for other purposes why presidents and development officers grow old before their time. Let me add that without the WPI Plan to Restore the Balance those gyrations might all have been downward. Tom Denney has contributed mightily to this effort.

It is easier to know 170 faculty than 2,000 students. In fact, without a permanent dean of faculty for two years it was impossible not to know the faculty well. From this knowledge I would stress two things: faculty are people with all the hopes, strengths, and weaknesses common to the species; and WPI faculty have an unusually strong commitment to the institution and its educational success.

Thus, as professional people engaged in a complex enterprise, our faculty has spent the last decade shaping a role for itself new to WPI but common to most good institutions. This role is more active individual participation in academic decision-making and is well described in the faculty constitution that was approved back in 1970-71.





Naturally enough, the relaxation of a previously strong hierarchical structure and the growth of a collegial structure has led to an excess of committees and requries a faculty reassessment of goals and priorities for each person's time. That is happening informally as each person becomes more sophisticated about the dynamics of the college. It is my belief that this expanded faculty role came about *because* of the unusual faculty commitment to WPI.

The existence of the WPI Plan is a tribute to our faculty as people and as committed members of the WPI community. Only people who wanted WPI to survive would commit such huge amounts of time to making the Plan work. I will grant that some are less than enthusiastic about it and some who still don't share the vision of our educational goals. But by and large our faculty are risking their livelihood and their professional growth to bring the Plan to fruition. It is my feeling that, as a result, we are regenerating a real and deserved pride in WPI as an educational institution. But a major problem we face is proper compensation for such dedicated effort.

Academics

Program

The work of all these people aims at a single goal, the provision of a superb education for the students who come to WPI. The WPI Plan is the mechanism, and a fine one, but it still depends on people and knowledge for its success. Let me remind you of the major academic areas in which we now work.

Engineering remains our major thrust, as it should. Science has been broadened to include biology. Computer science has become a major interest. Humanities has seen significant growth. And now Social Science will help in the total educational process. What the changes have been is most quickly portrayed in Figure 6.

The net effect has been a broadening of the concept of what consitutes engineering or science education. We are now perhaps more a technological university than an engineering college. We have, I believe, a new character, one that will help us meet successfully the challenge of the future.

One area that deserves a lot more attention in this report than I will give it is the graduate program. We have had an extensive and sound study of it by the Graduate Education Committee, but as a group we have not yet seen our way clearly. The graduate program is an important part of the intellectual atmosphere at WPI. You will hear much more about it in the years ahead.

Figure 6
Academics at WPI

Discipline/Dept.	*% of Undergraduate Majors*		*% of Total Credit Hours*	
	1965	1971	1970	1974
Chemical Engineering	15.2	10.5	3.9	3.8
Civil Engineering	15.3	20.0	5.9	9.2
Electrical Engineering	24.9	20.3	8.4	7.6
Mechanical Engineering	25.0	18.1	14.5	11.2
	80.4	68.9	32.7	31.8
Chemistry	4.2	6.8	12.3	3.8
Computer Science	0	4.2	2.8	6.1
Life Sciences	0	0	0.2	2.6
Mathematics	6.4	8.5	16.0	16.3
Physics	4.8	4.1	10.0	8.9
	15.4	23.6	41.0	37.7
Business/Economics	0	1.8	8.3	6.9
Humanities	0	0.9	13.0	15.5
Management Engineering	4.1	5.2	1.9	2.2
Physical Education	0	0	0.4	2.0
	4.1	7.9	23.6	26.6

Closely tied to the graduate program is continuing education. I believe we have made real progress in this area under Professor Robert Hall's direction and that the opportunities continue to be significant.

Services

Two critical components of the educational process at WPI were well under way five years ago. I refer to the library and the computer.

Professor Anderson and the Library Committee headed by Professor Moruzzi did a superb design job on Gordon Library. We are visited annually by dozens of groups who wish to copy and learn. But the goal of more learning materials in the library is far from fulfilled and made more difficult each year by inflation. A disappointment for all of us.

You all know of the trials and tribulations WPI experienced in arriving at an effective computing system for both academic and adminsitrative purposes. The terminal-dedicated DEC 10 and the batch-dedicated Spectra 70/46 have produced very satisfied users. Mr. Jackson's salesmanship to outsiders has made it possible for us to afford them. A faculty advisory committee has provided thoughtful analysis, guidance, conservatism, and self-restraint.

In both cases we see great opportunities in joint relationships with other Worcester institutions. Success is considerable with libraries as we share books and journals, cataloging and ordering, and planning for the future. The cooperation and responsiveness of our librarians has been truly pacesetting.

Unfortunately, early experiences with Clark have made true interinstitutional use of computers a presidential dream. Presidents Brooks, Appley, and I have not given up hope and continue to seek a joint effort. Like more library materials, shared computer usage is an unfulfilled goal.

On the other hand, here on campus we see real progress in academic technical services. Joining departmental technicians and machinists under Professors Howe and Corey is expected to lead to more effective and efficient use of their time. It is one more way of making us academically one community with common goals and shared responsibilities. It is essential as the growth of projects increases the teaching potential of our skilled technicians.

Finally in academic services, I see a considerable unmet need in laboratory equipment. In spite of many individual bright spots we have failed to keep pace with rapid changes in instrumentation and to upgrade or expand in many areas of need. The present administration and trustees have some real challenges in this area.

Physical Campus

Very early in 1970 it was clear that a new look at the physical aspect of the campus was needed. The Moore report and the subsequent trustee analysis focused on the physical environment related to student life as a prime target for our efforts. It is to that end on which many expenditures have been focused.

The Stoddard Residences were a beginning, followed by the Ellsworth and Fuller Residences offering a different lifestyle. The connection between Morgan and Daniels Halls awaits the new snack bar in Morgan to be a social center for students. The enlarged bookstore and student lounge area in Daniels Hall have been popular, well used, and effective in bringing students together. The enlarged and remodeled Pub in the basement of Riley is doing the same for students and for faculty.

The greening of the campus, when concluded, should carry this concept to completion. People, rather than cars, will be interacting on our campus. We hope that our efforts will pay off in the permanent closing of West Street and the creation of a people-centered pedestrian campus.

The Interactive Project Center on the top floor of Washburn Laboratory and the Project Center in the old Foundry building are prime examples of what one can do with solid old buildings. The essential character of the campus is unchanged but the personal and academic interaction among students and faculty is encouraged and eased. Learning is enhanced.

Development of the TV studio in the basement of Higgins Laboratories has set new standards in the use of video tapes as teaching aids and in how to get a lot of studio for your money. Its coaxial cable connection to other areas of the campus has been equally helpful to the teaching and communication processes.

In all this one thing is unchanged, the quality of care of the campus. Visitors constantly comment on the positive impression this creates. Though the staff of Buildings and Grounds continues its service from more diverse quarters they deserve our heartiest congratualations and thanks.

The net effect of these changes and the city's modification of Institute Road is a more attractive and people-oriented campus. I hope our next steps will continue that orientation while assuring greater safety, efficiency, and effectiveness. These next steps include the complete renovation of Salisbury (86 years old), Boynton (110 years old), and Sanford Riley (48 years old) as well as possible lesser changes in Washburn Shops and Alden Memorial. A constant need exists for less general renovation in other academic buildings. They may depreciate slowly, but depreciate they do.

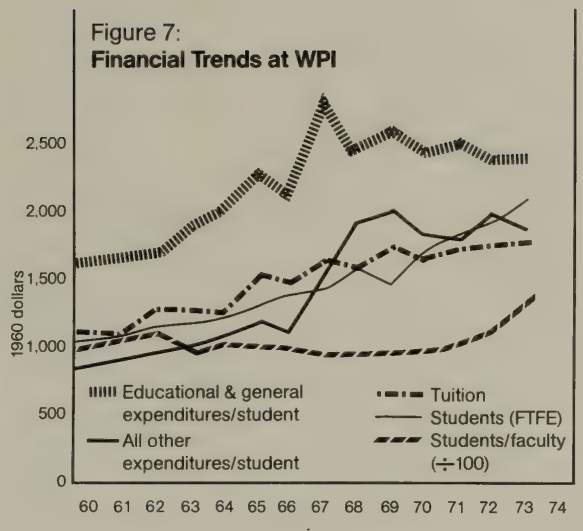
Financial Trends

Let me return to financial considerations with some material that bears so strongly on the future of WPI.

What you will see in this next set of graphs is a brief focus on WPI's "efficiency" or "productivity" or "problems," as the case may be. All expenditures are expressed in 1960 dollars (using the Consumer Price Index as a deflator) calculated as a per student value.

Figure 7 gives you a feel for general trends: enrollment rising at 5.5%/year to 1969 and closer to 9% thereafter; tuition rising at 6.5% to 1969 and 3.7% thereafter; educational and general expenditures per student rising at 12.6%/year to 1967 and dropping at 1.8% thereafter. It is pretty clear that you can reduce the cost of education per student when the student/faculty ratio rises. What happens to the quality of that education is then a matter of concern.

"All Other Expenditures Per Student" include dormitories, computers, student financial aid, and Alden Laboratories. The balancing income for these expenditures is such that the most appropriate method of presentation is as a net result. This is shown in Figure 8. It is interesting to note that the net result was an income figure up until the time that financial aid became financed from current income (and of course the rise of computers). Financial aid is noted by x's.



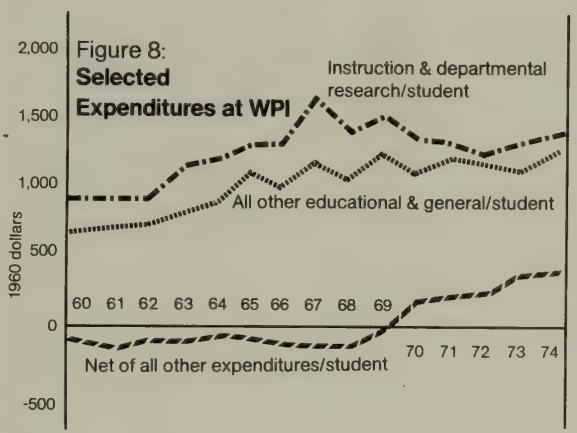
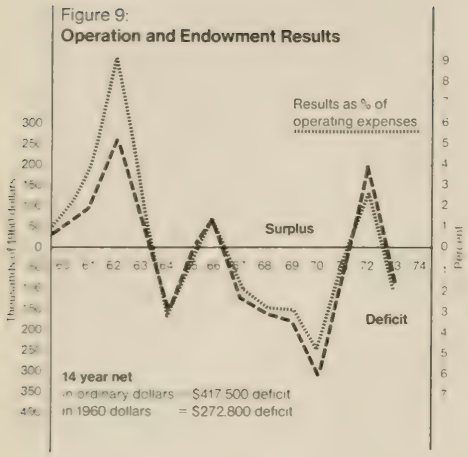
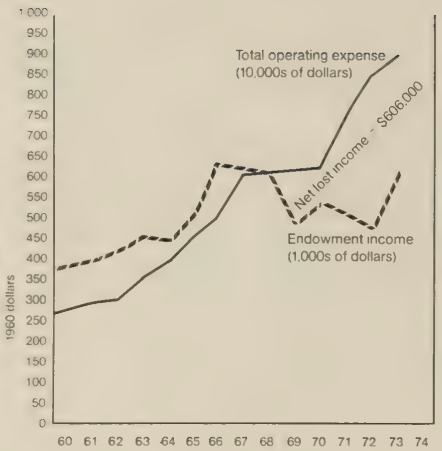


Figure 8 also shows another problem coming from present-day complexities and from success in other areas of WPI. Educational and general expenditures per student are separated between Instruction and Departmental Research versus Other Educational and General (administration, benefits, buildings and grounds, student services, fund raising, alumni, etc.). Though we *reduced* I&DR per student we have *grown* very modestly in the other. Very careful attention to this problem will be necessary in the future. Help in this area has come from detailed discussions with the faculty-administrative committee on Administrative and Financial Policy. But this competitive world of admissions, fund raising, and academic innovation makes cost-cutting difficult.

Finally, in Figure 9 I return to the data of Figure 3 with the total operating expense added. Here we see one major contribution that trustees can make and a major problem that private colleges have to solve. Until 1966, endowment income kept reasonable pace with operating expense at about 15% of the latter. Since that time the decline in endowment income has been a real problem. In fact,

Figure 9:
Operation and Endowment Results





had endowment income stayed constant at the 1968 figure we would have had a $330,000 total operating surplus over the past 14 years. But it appears impossible to retain the earlier 15% as other than an idealistic goal.

Thus as we all look at the future of WPI we have to recognize that faculty and staff cannot do the whole job. Trustees can and must make a major difference in our viability.

Our Neighbors

The last five years have seen a revitalization of Worcester pride and cooperative action focused on Worcester Center. Very similar in nature has been the development of cooperative approaches to higher education through the Worcester Consortium. I have seen large and positive changes in behavior toward each other by our eleven institutions because the presidents and deans and faculty members have sat down together to consider common problems.

Our libraries coordinate closely, our students mingle on each other's campuses, state funded scholarships go through Worcester State to the private colleges, purchasing is a common function, continuing education is jointly presented to users. It may be only 6 years old as an entity but the Worcester Consortium is one of the most effective in the country, even though *we* think it still imperfect. As a matter of fact, state government officials constantly cite us as a model for others to follow.

This success with such a divergent group has led Clark, Holy Cross, and WPI into even closer relationships in student affairs, student/faculty research, shared library efforts, research management, and common departmental planning. We see the germination of some tender but potentially bounteous crops in both increased quality and reduced cost of education.

Character of WPI

WPI's character has changed from five years ago. As I read our history, WPI's character now is very much as it was in the 1880s when Charles Allen, Milton Higgins, and George Alden were creating waves with their new kind of "practical" education. As you read the civil and mechanical engineering journals of those days you have the same sense of innovative people at work here, and of outsiders viewing the process with both skepticism and admiration.

Engineering colleges across the country *are* different from what they were five years ago. Our differences in five years are greater because we stayed too long in one mode while others moved ahead. Now we have leapfrogged them through a really incredible set of actions by our faculty with strong encouragement and support by trustees and administration.

My present perception of WPI's character can best be described as a college of individualized quantitative thinking. It is more than a classical engineering college, for it recognizes that its graduates will do many more things in their careers than engineering or science. But whatever they do, they will take with them the habits of logical thinking that come from the demands of quantitative solutions to problems, solutions that also concern themselves with human values and social forces. If we succeed, we will have educated the leaders of tomorrow . . . leaders with the knowledge needed yet with the integrity that makes people willing to have them as leaders. With this in mind, I believe WPI will mean as much to the country as M.I.T., Caltech, or RPI.

Conclusion

This has been a lengthy account. Many people and problems have been omitted even so. But I do hope you can see the thrust of WPI in the 1970s. It is to achieve the goals of the WPI Plan as our educational objective; to make sure that we have the people to do so – both faculty and students; to bring our academic facilities up to the quality essential for the Plan's success; and to fund the operation in ways equitable to all involved.

Such global statements of our objectives need some particularization to make them real. Let me try to do so as follows:

1. WPI's educational mission is high quality undergraduate education with a few centers of excellence in graduate research and the necessary scholarly work that keeps its faculty good and up-to-date.

2. WPI is and will remain a small college with about its present enrollment. WPI is solvent, with a generally fine campus and physical plant.

3. The growth of the life sciences and social sciences and of the number of women students at WPI is essential for quality and sustained enrollment.

4. The economic pressures on our natural sources of students, the middle or lower middle income family, will force a pattern of increased state support of us, of all private higher education.

5. These same pressures and our own search for quality will lead inevitably to much closer working relationships with our sister institutions, with public institutions through the Association of Independent Colleges and Universities in Massachusetts and with the Board of Higher Education.

6. The need for successful achievement of the WPI Plan to Restore the Balance is clear – in the upgrading of faculty and staff salaries, the equipping of our laboratories and library, in the day-to-day operation of the college.

7. We are at a kind of crossroads. We have generated the means for future success of WPI –faculty, facilities, students. But if we now fail to grasp this opportunity for lack of funds, all will be lost. Now is the time for renewed effort, the extra push, the special action. Relaxation is something we cannot afford.

8. The commitment to WPI of all of us – trustees, faculty, students, and alumni – must continue at its present high level if we are to succeed. In case you wondered, I believe that private higher education is just about the most exciting place to work that anyone can find in the 1970s. If you agree, then WPI will also be one of the most successful.

WPI

Coombsie

by Carl A. Keyser '39

WHEN I MET HIM, Zelotes Woods Coombs had been on the faculty for forty-six years and he had achieved a reputation as formidable as his name. He was rotund and stocky, a man whose pink face was framed by a wisp of well-trimmed snow-white hair. Coombsie, as he was called when he was beyond hearing range, was said to have been a boxer and an advocate of Teddy Roosevelt's vigorous life during his undergraduate days at Amherst, and he claimed to have hiked, not hitchhiked (for there were no cars in those days), from Amherst to his home in Worcester in less than twenty-four hours. Looking at Coombsie as he approached seventy, I'm sure this was no casual boast, for he still had the figure of an athlete.

Professor Coombs took a Master of Arts degree from his alma mater in 1895, today's equivalent of at least ten years' postdoctoral studies at the Sorbonne. In any event, it qualified him as a professor of languages and English, and for eventual service as Dean of the Institute, and as marshall of the Fall homecoming parade. For this last task he carried a coxwain's megaphone through which he gave brisk and somewhat imperious orders to keep the procession moving. It moved. Dean Coombs was crisp without being impolite, majestic without being overbearing, formal but not unfriendly, and as interesting as he was interested.

Coombsie taught a course for freshmen as well as courses in English literature and composition. I got a double exposure. The freshman course was supposed to deal with the history and development of Indo-European languages, but in Coombsie's hands this became merely and excuse to discuss almost every topic found in any respectable encyclopedia, Britannica included. It was all really a thinly disguised attempt to propel engineers into a world which lay beyond slide rules and log tables. My recollection of course content, thirty years after, is sparse, but less sparse than for some technical courses I suffered. We were told, for instance, that the Aryans came out of Iran and India and that over the ages they had migrated westward and northward into Europe. I remember being surprised to learn that the brown-skinned Indians of India were just as Aryan as the rest of us. This was news to me and probably would have shocked Adolf Hitler who, incidentally, never discovered that the Arabs of whom he was so fond were just as Semitic as the Jews of whom he was not so fond. At the moment it appears that both Arabs and Jews have forgotten what Hitler never learned.

Another interesting fragment of information I retain is that one could step from a Turkish bath into a Finnish sauna and hardly notice the difference since the Turks and the Finns are as closely related as their languages. This is the result of a tribal split and the migration of a part of the tribe northward to Finland where they developed in isolation from the portion of the tribe which remained behind. Although I have never verified such pronouncements of my old professor I have used them on occasion to impress, where it was necessary, some windbags who needed impressing. The claims have never been challenged. All this proves the value of what might otherwise be considered useless information.

Attendance was mandatory for the Saturday morning lectures of the freshman Indo-European language course. In fact, attendance was its only requirement, and so important was attendance considered that Coombsie used a good portion of the lecture period to call the roll. There were 200 freshmen in the class and no name was omitted, though it was suspected that false muster was given on occasion, Saturday morning being Saturday morning. The same procedure was followed in the English literature and composition course, and in addition here we were required to seat ourselves alphabetically. But since the classes had only about twenty students, calling the roll was not burdensome. I can still hear the professor calling "Karna, Kay, Keyser, Kulin . . . "

Calling the roll was not a wasted effort. Believe it or not, the professor got to know his students as persons, and the students got to know each other. If it has been your hapless luck to attend almost any big modern university you will certainly have observed that it is a rare professor who can name more than two of his students. Just as often the students can't name their professors, which evens the score. More amazing than this, after forty or so class periods of elbow to elbow contact, today's students often depart without knowing anything about their neighbors, not even their names. Such is the happy impersonality of modern college life.

Coombsie's treatment of English literature went far beyond Shelley, Byron, and Shakespeare. It was a history of England, and William the Conqueror, the Plantagenets, the Tudors, Cromwell, the many Georges, and the rest of England's great figures marched in grand style across the dais of the classroom. Post Coombsie's course it was easier to name in sequence the rules of England from Henry II to Edward VIII than it was to name American presidents from Roosevelt to Roosevelt. The implications and complications of Edward's romance with Wallis Simpson and his eventual abdication were discussed in a memorable impromptu lecture, and England's great constitutional crisis became our constitutional crisis.

English composition was taught with a vengeance, for the professor managed to read, correct, and grade all the papers himself. This I knew because of his distinctive penmanship.

Professor Coombs was probably just as aggravated by the problems of the world, and there were many in the mid-thirties, as the next fellow, but he was not one to solve them via pomposity in the classroom. Coombsie's classroom world was limited to the literature and history he loved, and to teaching us to write clearly, concisely, and correctly. He came closes to showing irritation when a student colloquially used the word *thing* rather than naming the object. "A very weak word, very weak," he would say.

"Never, never use it." And since it was often used, the advice was often given. I still cringe when I slip into the habit, even though there is no mention of this sin in Fowler's *Modern English Usage.* Perhaps Fowler and his heirs could have learned from Coombsie.

In composition class the question of what to write about came up every year. Long before my time some unremembered freshman had written an essay entitled "My Climb up Mount Asnabumskit." It must have captured the colors of Fall, leaves crunching underfoot, and the smell of the woods before they were contaminated by the exhaust of a thousand cars. In any event, the essay made such a lasting impression on the professor that over the years it had become his standard of excellence, and he recommended it as a suitable topic. I never determined that there actually was a hill called Asnabumskit, and today the lingering suspicion remains that the professor invented the whole story, for it is not likely that an engineering freshman could be moved to such poetic achievement.

Coombsie owned a 1932 spanking black Plymouth sedan which brought him to work every day. This remarkable car had only one speed: twenty-five miles an hour. Not twenty-four, not twenty-six, but twenty-five. At twenty-five miles an hour, nodding to acquaintances along the way, the professor would glide majestically along Worcester's streets, through traffic, with traffic, or past it if it were going less than twenty-five miles an hour, uphill and downhill . . . and probably through stop lights and stop signs, always at twenty-five miles an hour, just like a Sherman tank riding over the hedgerows of Normandy.

The professor was a full-time gentleman, always impeccable in his black suit and vest, a freshly starched white shirt, and ribboned pince-nez either on his prize fighter's nose or tucked in his breast pocket alongside a neatly folded handkerchief. Vests have disappeared as room temperatures have risen and will probably not return until the energy crisis becomes more than a topic of conversation. [Editor's note: it has!] And gradually over the last few decades, professors have also shed their coats, abandoned ties, and for some few even forgotten their shoes. Being a well-groomed gentleman is no longer highly regarded in the academic world — or if highly regarded, it is, when absent, not highly disregarded. Even cleanliness is no longer considered to bring one in proximity to the Lord. Today Coombsie would more than likely be cast in the role of misfit. His courtly dignity, his gentlemanly example, his gift of conversation, his interest in students, have, like his black suit, vest, starched shirt, pince-nez and 1932 Plymouth, proceeded, presumably at twenty-five miles an hour, to oblivion. One wonders if we are any better for it.

Carl A. Keyser, *'39, according to his latest book jacket, was born in Washington, D.C., but escaped unharmed to New England where he has lived since 1946. During the war he discovered it was just as easy to get seasick in the Mediterranean as in the Atlantic, and no more fun. After the shooting and shouting stopped, he beat his ship into a plowshare and got a job in a shoe factory where there was no shooting but some shouting. His moral decline started when he became an assistant dean of a college. Undaunted, he managed to work himself down to Commonwealth Professor Emeritus and retired in 1968 from the University of Massachusetts when shouting and shooting again seemed imminent. He is the author of several widely used engineering texts, of which one has been translated into Spanish and another into Japanese. Both editions are easier to read than the IRS Instructions for Form 1040. He and his wife and three sons live in Amherst. In between books, he paints, skis, sails and plays a terrible game of golf.*

Up in the air, Junior Birdmen . . .

Photographs by John F. Wellsman

IF YOU EVER TELL Bob Goodness, '70, to go fly a kite, he'll go you one better. He'll fly *in* it!

The kind of kite that Bob flies does not look like a fish or a bird and it can't be purchased for $1.29 at your neighborhood drugstore. His kind of kite weighs between 25 and 40 pounds, looks like a four-pointed flying wing, and is more accurately called a hang glider.

"You just strap yourself into the harness beneath the glider, run down an open hillside, and hope that the prevailing winds do not exceed 25 miles per hour," he says.

This type of daredevil activity is currently taking place all the way from Maine to California, and when practiced from coastal dunes and cliffs is called skysurfing. For obvious reasons.

"Cape Cod is my favorite location for skysurfing in the New England area," Bob says. "There the onshore breeze is nearly always constant and you can skysurf in the truest sense of the word. Where the sea breeze hits the rising shore lands it forms an up-current of air or wind wave. You sail right along with the wind currents. Fantastic!"

Daredevil or not, Bob Goodness leaves little to chance when it comes to the construction of his glider. He is a co-founder, vice president and general manager of Man-Flight Systems, Inc., a firm in Worcester which manufactures the ultra-light, foot-launch skysurfer kites and also publishes the magazine *Skysurfer.*

"Hang gliders can be homemade," he explains, "and some of them turn out fine. But our company tries to make sure all the structural members of the kite are in order, all fasteners secure, and everything properly rigged. It's a tricky thing to figure out by yourself. So is learning how to maneuver the wing."

And how does one learn to skysurf? According to Bob, after you have selected your hillside or dune, you double check your kite to be sure it is in safe working order. "This is a must," he says. For the initial trials, run with the craft along the ground to get a feel for the center of balance and lifting power of the wing. Then you strap yourself into the body harness (either a prone or sitting type).

Partway up the slope, turn the kite into the wind and see that the sail is fully inflated. To take off grasp the uprights and run down the hill with the sail partially inflated. A few feet further down the slope gently push forward the uprights and you'll be airborne. You can change direction by shifting your weight from side to side and pushing the control bar. Pull yourself forward to dive and backward to climb and slow down. When landing you'll want to push yourself way back to stop the kite at about four feet above the ground.

"There just isn't another sport that gives the same sensation of freedom as skysurfing," Bob concludes. "It's mind-blowing."

Also mind-blowing is the fact that the craft requires no fuel, no license, creates no pollution, and will get you as close to Jonathan Livingston Seagull as you'll probably ever get under your own steam.

Ready for the nearest cliff, anyone ?

Below is Goodness' latest project, the monoplane Eagle II. This has attracted national attention, being featured in Popular Science, Sport Aviation, *and is slated for a cover story in this month's Scientific American.*

"...and he knew with practiced ease that he was not bone and feather but a perfect idea of freedom and flight, limited by nothing at all."

You went to an engineering school, so you're an engineer, right?

Wrong.

by Ruth Trask

IT HAPPENS that quite a few WPI engineers turn their backs on the slide rule and drafting table after graduation. This has always been true to some extent, and the accelerating pace of changing social patterns will almost certainly increase the number of alumni and future graduates who decide to change careers, whether soon after graduation or in later life.

So we picked a sampling (who's to say if it's representative?) of WPI engineers turned non-engineers, to see just what they're doing and why.

From the chemistry laboratory to a justice's chair in Worcester's Central District Court is the story of **Ernest S. Hayeck, '46,** whose career changed course after his brother was killed in an airplane accident in September 1952.

"My brother Albert was a lawyer," says the recently appointed full-time justice. "And right after he died we decided that either my brother George or I would pursue a law career. Ten days later I was enrolled in Boston University Law School."

At the time of his brother's death, Justice Hayeck was teaching chemistry and mathematics as an assistant professor at Stonehill College in North Easton, Mass. Previously he had received his MS in chemistry from Boston University in 1950 and his BS from WPI.

Since receiving his law degree from Boston University and passing his bar examination in 1955, Justice Hayeck has been practicing law in Worcester. He has served as an auditor and a master in the Superior Court in Suffolk, Norfolk, and Middlesex counties. In 1964 he formed a law partnership (Mullaney & Hayeck) with Worcester's former mayor, Paul V. Mullaney.

Gov. Francis W. Sargent nominated him to be a special part-time justice in Worcester's Central District Court in 1970, the nomination subsequently being approved by the Governor's Council.

At the time of his nomination Justice Hayeck said, "No judge should be looking for prestige when he is appointed, but to serve the community . . . A judge must give serious decision based on reflection and application of the law even though the matter does not involve millions of dollars. The small man should receive full treatment . . . I will be practicing law from the other side and it will increase my perspective of the law."

Last year Governor Sargent named him as a full-time presiding justice of the Worcester Central District Court and he was sworn in at ceremonies on May 8 with some 200 well-wishers in attendance at the packed criminal court chambers of the Worcester County Courthouse.

The governor, who administered the oath of office, called the new justice, "a man who has already, without any question of doubt, those qualities that will not only make him an outstanding justice in the central court but in this system."

To central court Justice Ernest S. Hayeck, his investiture was "the fulfillment of an American dream."

Frank E. Magiera, '67, reporter for the *Worcester Evening Gazette,* is a management graduate who decided to go into writing full-time. "I always liked to write, anyway," he reports. "As an undergraduate I was editor-in-chief of the *Tech News* and I wrote part-time for the *Worcester Telegram* and *Gazette."*

Even in his college days, Frank was apt to be where the news was breaking. He was on the varsity teams in football and lacrosse, served as a member of the Tech Senate and the Council of Presidents, and was voted into Skull and Pi Delta Epsilon (the honorary journalism fraternity). He was also listed in the 1966-67 edition of *Who's Who Among Students in American Colleges.*

Now he keeps on top of the breaking news in and around Worcester every weekday. "I have to work fast," he admits. "The deadline for the *Gazette* is 11:15 a.m. Still, I check facts as far as I can and try very hard not to give the wrong impression with my stories, no matter what my personal opinions may be."

"Book and movie reviews are not part of my regular job," he says. "But I enjoy doing them on the side, even though the readers do not always share my opinion. There was quite an uproar when I panned the children's movie "Bedknobs and Broomsticks."

Recently he has written articles covering the energy crisis and city and state government developments. Frank has done some free-lance work for *Feature Parade,* the Sunday magazine section. He dislikes doing business and financial articles. What he likes best is investigative reporting and he expects to be doing four or five projects a year in that area, along with a newly-formed investigative team.

When asked about his interviewing methods he said that he preferred to do a face-to-face interview rather than rely on a tape recorder. He likes watching a person's eyes when he talks because the expression can tell a lot about character. [Also, taping has been found to be highly unreliable.]

After more than six years of writing for the *Telegram* and *Gazette* in various capacities, spending a year with AT&T in New York, doing a part-time stint with the *Virginia Beach* (Va.) *Sun* while a naval lieutenant, and studying evenings at Suffolk University Law School, Frank has no regrets that he turned from engineering to journalism.

"I like my life," he confides. "Even though I've been surprised to discover how many liars there are in the world."

Not divorced from his engineering background completely, Frank Magiera keeps a slide rule in his desk drawer. "It's great for figuring percentages," he explains.

Possibly **George T. Abdow, '53,** is the only head lineman in the Eastern Intercollegiate Football Association who heads a $4.3 million a year business. He certainly must be the only chemical engineer-head lineman-restaurateur. And he knows all about percentages.

For the past three years, the Abdow Big Boy Restaurant chain, of which George is president, has averaged a 10 percent growth. This is almost 3 percent better than the national average for similar restaurant chains.

Seven family-style restaurants currently make up the chain which is owned and operated by George and his brother Ronald. One is on Stafford Street in Worcester, while others are located in Springfield and Chicopee, Massachusetts, and Enfield and Wethersfield, Connecticut.

George Abdow had no experience in the restaurant field prior to his affiliation with the Big Boy chain. After graduating from WPI as a chemical engineer, he was a shift supervisor for duPont in Aiken, South Carolina. Then he spent a couple of years in the U.S. Army Chemical Corps before joining the family business.

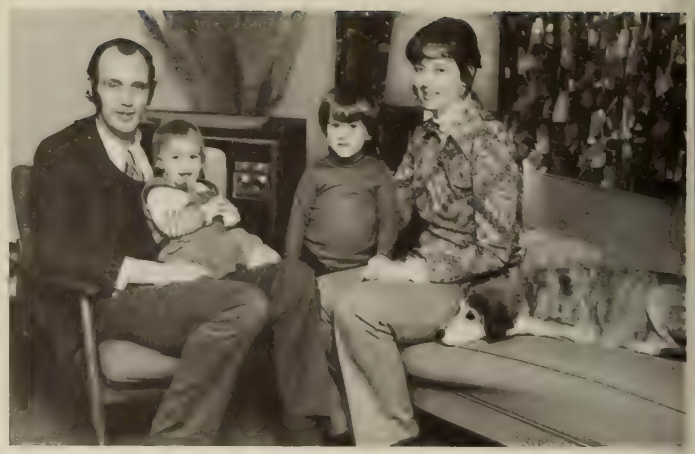
His father, Towfee G. Abdow, owns Abdow Scrap Iron Co. on Canterbury St., and in 1957 the sons joined the family business, with George specializing in nontechnical sales and the purchase of scrap metals. In 1959, however, George and Ronald became more interested in hamburgers than scrap iron. They wanted to buy a franchise in the Big Boy restaurant chain and start their own business. Their parents lent them $10,000 and they soon found themselves on the ground floor of the restaurant business with their first establishment on Route 5 in West Springfield.

In the beginning, the Abdow Brothers actually did rely mainly on the hamburger trade. Big Boy hamburgers, fried chicken, and strawberry pies remain their "bread and butter" items, though the restaurants have grown to a complete family menu and service.

Although George is president of the chain that now has some 450 employees, he still knows how to wait on tables and do kitchen work when things get busy.

"We never forget that when we first started we regularly put in over 70 hours a week," he recalls.

Strenuous as his schedule sounds, George realizes the importance of staying in good physical shape. At 43, he can run the mile in under 6.5 minutes. "Staying in shape is important, not only for my football officiating, but more important, for my work." he says. "The better condition I am in, the more efficient and productive I am at work. Staying in good shape helps the restaurants and myself to run much better."



It may sound like quite a jump from electrical engineer to "fashion king" but for **Anthony "Tony" Trippi, '64,** it wasn't all that difficult.

"You might say it was my family background that made the jump easy," he explains. Presently Tony is headquartered in Shrewsbury, Mass. with his father Frank Trippi, the "pants king," and his brother Mike, the "style king," at their men's clothing store.

While Tony had virtually grown up in the men's clothing business, he didn't make a career of it until fairly recently. "After graduating from WPI I did use my engineering background for a number of years," he says. First, he was a supervisory assistant for New England Telephone in Chelsea, Mass. He then worked for Jackson & Moreland in Boston as a consulting engineer before moving on to Sperry Gyroscope in Long Beach, California and Northeast Airlines in East Boston. Later, while working for Sperry Rand, he resided in Madrid while associated with Iberia Airlines in Spain, Portugal, Italy, Israel, and Africa.

Now that the wanderlust has been more or less shaken from his shoes, Tony finds that taking part in the family business is a very natural thing to do. "My grandfather started the ball rolling," he says, "And passed it along to us. He owned and operated the former Worcester Pants Company. My father ran the manufacturing and retail concern for 25 years, too, but decided to go into the retail end of the trade exclusively. About ten years ago he moved the business to our present location at White City Plaza."

Trippi's still retains a taste of the manufacturing by providing "free alterations while you wait in four minutes" on all pants bought at the store.

During the past decade the business has grown tremendously. People from as far away as Rhode Island and Connecticut shop Trippi's.

"That's because we can completely outfit a man or boy from head to toe," Tony explains. "No matter if he's size six or sixty-six we can furnish him with everything from socks to shirts. Pants remain our specialty, though."

Not only does the store carry a huge range of sizes, it also features a multitude of styles. (Tony's father has often said that he never met a man he couldn't fit.)

"Naturally we carry the most up-to-date of fashions and fabrics," Tony continues. "At the same time we keep a large stock of unusual and hard-to-get apparel. You ask for it. The chances are we have it."

Like many businesses, Trippi's has a motto.

"Ours is 'selection, quality and service'," Tony says.

With a motto like that and three "kings" to back it up, Trippi's just can't help being a continuing success.

Dr. Charles "Chuck" Belanger, Jr., '62, graduated from WPI as a physicist. He then decided to go into medicine, and today he is a pediatrician in Saco, Maine.

"I changed to pediatrics because I discovered that is the field I like best," he says. "I feel right about my work."

In July 1973 Dr. Belanger, his wife Gail, and their children Joy and Christopher moved to Saco from Ft. Benning, Georgia, where he had served two years as an Army captain in the pediatric department of the Army hospital there.

Since both the Belangers are New Englanders (He's from Holden, Mass, and she's from Paxton), they were pleased when the chance came for them to return to the area.

It might be assumed that going from a large Army hospital which serves 25,000 people to a smaller area hospital would involve a cutback in medical facilities. Not so, says Dr. Belanger. He has discovered that the general health of his patients is good. He attributes this in part to the fact that the immunization level is high and to the easy access to health care. There are areas not too far away where inadequate housing and inadequate amounts of food are common and are the leading health problem.

One thing that has surprised Dr. Belanger is the patient load. His day starts at 8 a.m. and often ends after 9 p.m. Weeknights his office is open until 8:30 or 9 and on Saturdays from 8 a.m. until noon. He and the other doctors at the office work at Webber Hospital in Biddeford on a three to six month rotating basis. And, of course, there are emergencies that can come up at any time. All these add up to a very full schedule.

After graduating from WPI (where he was awarded a Salisbury Award for outstanding scholarship), and attending graduate school at the University of Wisconsin (where he was a teaching assistant in the physics department), Belanger completed the two-year medical program at Dartmouth College and received his MD from the University of Vermont Medical School in Burlington. Later he took his internship and residency training at Buffalo (N.Y.) Children's Hospital.

Now that his training is completed and he is a practicing physician, Dr. Belanger has come to believe that doctors will never resume making house calls on the same scale as they did years ago. "This is because a doctor has equipment in his office with which he may make a more accurate diagnosis of his patient's illness," he explains.

Dr. Belanger has no regrets that he decided to return to New England. He finds the caliber of the doctors in his area "impressive" and the medical facilities "outstanding." He also feels that for him, the move from physicist to physician was the right one.

The data on which these class notes are based had all been received by the Alumni Association before October 1, when it was compiled for publication. Information received after that date will be used im succeeding issues of the WPI Journal.

1908

How come '08 came to be known as the "elephant class?" Here's how: The freshman football team beat the sophs at the Oval where the Lynch Furniture Co. had three different sizes of tin elephants painted gray with red blankets on which was enscribed "Watch Us Grow." So the class appropriated the smallest elephant and easily changed the wording to "Watch '08 Grow." Since it was impossible for all the freshmen to board the trolley to town, the entire class, with the elephant at the head, marched the two miles into town. That night the door in Boynton Hall tower was smashed and the '08 elephant was strung up on the flag pole.

The next day Prof. Coombs called a meeting of the class and threatened to expel the guilty parties. However, agreement was reached that if the class would pay the eight dollars required for a new door, the matter would be overlooked.

Doorstops in cast iron were made and each member at the next reunion was presented with one. Thereafter gray capes with the '08 elephant on the back, were used at reunions.

Whatever happened to the original tin elephant has always been a mystery! — DONALD D. SIMONDS, Secretary

1912

FREDERICK H. WARING was the author of the article "Retirement Involvement Begins Early" which appeared in the May issue of *Ohio's Health*. He is a retired chief engineer of the Division of Sanitary Engineering, Ohio Department of Health, where he served for 45 years.

1914

The widow of Dr. MEI YI-CHI recently spent five weeks in Peking where she visited 60 relatives and friends from various parts of China. She also met many colleagues and students of her husband, who for nearly 20 years was president of Tsing Hua University.

1921

Mr. and Mrs. LINCOLN THOMPSON observed their 50th wedding anniversary on August 25, 1974 at a celebration at their home in Cheshire, Conn. Mr. Thompson, a WPI trustee, is a former president of Raymond Engineering in Middletown. He has continued on the board of directors of the successor corporation, Raymond Precision Industries. The Thompsons have four children. Their son Ronald, '52, is the president and chief owner of TAT Engineering Corporation, West Haven, Conn.

1924

Lt. Col. WILLARD A. GALLOTTE (AUS Ret.) and his wife are working as volunteers in famine relief and rehabilitation for drought-stricken areas of Ethiopia. They arrived in Ethiopia on Sept. 3 and due to the Cyprus situation were routed to their destination via Spain and Turkey. Currently Col. Gallotte is serving as director, purchasing and inventory control, for S.I.M. (R&R), Addis Ababa.

1935

ALLAN F. HARDY, Jr., president-treasurer of Hardy Contractors, Inc., Princeton, Mass., is also president of the Allan Hardy Associates, Weston and a director of the Newton-Waltham Bank & Trust Co.

1937

GORDON CROWTHER was elevated to the position of grand supervisor at the annual convention of the honorable Order of Blue Goose International held in Salt Lake City, Utah. His position is the number two spot on the executive committee. Blue Goose is a fraternal organization within the property insurance field with approximately 10,000 members located throughout all sections of the U.S. and Canada. . . . A. HAMILTON POWELL is a consulting engineer at United Engineers and Constructors, Philadelphia, Pa.

1939

EDWARD C. DENCH has been named chairman for the current United Way drive at Raytheon Company. Last year over 40,000 company employees, nationwide, gave a record $1.7 million. Mr. Dench is a staff consultant for energy and environmental affairs with Raytheon's microwave and power tube division in Waltham, Mass. He joined the firm in 1947 and presently holds over 60 patents for electrical and electronic inventions and has published numerous papers. . . . R. A. JACQUES serves as sales manager at Pelham Machinery Co., Dumont, N.J. . . . OIVA J. KARNA has joined the Rust Engineering Co. in Birmingham, Ala. . . . ERNEST L. SYKES currently works as a volunteer water engineer for VISTA at the Northern Rio Grande Water Development and Support Corp., at

1934

(The following account arrived too late to appear in the Reunion issue.)

The Class of 1934 had an enthusiastic group of 60 people at our Fortieth Reunion. A dinner was held on Friday evening at the Sheraton-Lincoln Inn in Worcester, arranged by Chairman Gus Larson.

Class President Ev Sellew presided over a short business meeting. Class Treasurer John Keenan gave a report on the class treasury.

Charlie Frary, chairman of the Fortieth Reunion Gift Committee reported on the fortieth reunion class gift. He reported that a very creditable $20,000 had been raised and recommended that an appropriation be made from the class treasury to augment this sum. The class voted $800 for this purpose. After Steve Hebert mentioned that funds were needed to fix up the administrative area in Boynton Hall, it was voted to designate the gift for this purpose.

Class Secretary Howard Whittum distributed collected biographical papers of the members who responded. The very attractive booklet was produced by the girls in Steve Hebert's office.

Bill Locke gave a most interesting account of the changes that have taken place on the Hill in recent years, culminating in the recently developed WPI Plan.

The class voted to meet again on our Forty-Fifth.

On Saturday at the alumni luncheon we were proud to learn that one of our class members, Luther Leavitt, was the recipient of the Herbert F. Taylor Award for dedicated service to WPI. Luther has been very active as an alumni chapter leader, council and fund board member.

Members attending were: Phil Stafford, Charlie Dayton, Howard Whittum, Howard Atkins, Howard Stockwell, Eugene Parta, Charlie Frary, George Kalista, Warren Snow, Allan Catheron, Luther Leavitt, Carl Hammarstrom, Bill Burpee, Charlie McElroy, Tony Cowal, Dwight Dwinell, Joe Flanagan, Ted Hammett, Ray Sjostedt, Ed Markert, Paul Sullivan, Ev Sellew, Warren Davenport, Gus Larson, Bert Anderson, John Keenan, Boylston Campbell, Al Phelps, Louis Press, and Don Vibber. Prof. and Mrs. Bill Locke were guests of the class.

Howard Whittum, Secretary

Espanola, Fairview Sta., New Mexico. He is on a year's leave-of-absence from Lawrence Lab. at the University of California in Berkeley.

1941

Married: GORDON T. GURNEY to Mrs. Claire D. (Goodrich) Slovin on September 5, 1974 in Holden, Massachusetts. Mrs. Gurney graduated from Salter and is employed in the learning disabilities program of the Wachusett Regional School District in Holden. Her husband works for Feecon Corp. in Westboro.

1945

Dr. CARL CLARK, former head of the department of life sciences at WPI, is now executive director for the Commission for the Advancement of Public Interest Groups in Washington, D.C. . . . JAMES J. SHEA is associated with the Atomic Energy Commission in Germantown, Md.

1946

WILLIAM G. DALY was recently promoted to president of the Hill's Division at Riviana Foods, Inc., Houston, Texas. The responsibilities of the division will be the production and marketing of all pet food items including the line of commercial dog foods which will be produced by the Hill's division but marketed through the grocery products division. . . . WILLIAM R. GROGAN, dean of undergraduate studies at WPI, spoke about the WPI Plan before the Exchange Club of Athol (Mass.) in October. . . . CARL W. BERGMAN, Jr. serves as branch chief at the Defense Communications Agency in Reston, Va. . . . JOHN M. LONGO is vice president of VOA NAT in Washington, D.C.

1949

KARL BERGGREN has been named plant manager at Elastomers, Inc., Williamsville, N.Y. The firm is a custom caster of urethane parts and manufacturer of engineered devices.

1950

GLENN E. FROM works for Rockwell International, Space Division, Downey, Calif. . . . Col. FRANK W. HARDING III (USAF), a director of procurement, has just been reassigned to Wright Patterson AFB, Ohio from Griffiss AFB in Rome, N.Y.

1953

CHARLES D. FLANAGAN was recently named manager of the appliance and heating controls department as well as manager of commercial controls in the Control Products Division of Texas Instruments, Incorporated, Attleboro, Mass. He joined TI in 1955. A member of the Attleboro Chamber of Commerce, he has also been active in the United Fund and YMCA work. He is a commander in the Naval Reserve. . . . Presently THOMAS P. O'CONNOR serves as dean of the evening school at Worcester Junior College.

1954

WESLEY D. WHEELER has formed a new corporation, Wesley D. Wheeler Associates, Ltd. (International Maritime Consultants) in New York City. Prior to establishing his own practice, he was technical director of American Bulk Carriers in New York. Also, he has spent extensive time in Europe leading vessel construction and conversion programs and served as technical counselor to the New Shipbuilding Group in the Bay of Cadiz in Spain. Mr. Wheeler, who is a chartered engineer with a master's degree in naval architecture and marine engineering from the University of Michigan, is a member of a shipbuilding family which has built thousands of yachts, commercial craft and military vessels. His son, Wesley, is a freshman at WPI. . . . ROY H. WISE, a communications consultant for New York Telephone Co., and his wife, Miriam held a macrame structures exhibit at Caldwell (N.J.) College in September. Miriam does the innovative macrame (finger weaving) and Roy builds the frames, making the couple pioneers in creating unique sculptural home furnishings. Among their creations are sliding framed window and door panels, macrame covered tables, lamp shades, and curtain panels. They like to work with jute, which is rough-looking and doesn't show stains.

1958

CHARLES B. CUSHMAN holds the post of manager of manufacturing at Lobo Golf Corp., Orlando, Fla. Previously he was a golf club design engineer at Wilson Sporting Goods. The Cushmans have a daughter and three sons who are enjoying their location close to Disney World. . . . Dr. FRANK D. DEFALCO has been promoted to assocate professor of civil engineering at WPI. He recently received his PHD from the University of Connecticut. . . . STANLEY L. GREEN is associated with SPARCOM, Inc., Alexandria, Va.

1959

JAMES A. ALFIERI, a bridge engineer with the state of California department of transportation office of structures, is president of the Santa Rosa school board. . . . PETER A. NELSON has been appointed manager of test operations for the Electro-Mechanical Division of Westinghouse in Cheswick, Pa. Formerly he was a senior engineer. DAVID A. SAWIN, assistant vice president of Worcester Bancorp, Inc., was recently elected controller of Worcester County National Bank. Last year he went to Worcester Bancorp where he has been responsible for the refinement of financial controls for the rapidly growing nonbanking subsidiaries, Wornat Leasing Corp., Wornat Development Corp., Wornat Insurance Agency, Inc., and The Empire Group, Inc. Previously he was controller and personnel manager at Hobbs Manufacturing Company of Worcester.

1960

FREDERICK W. KLOIBER serves as chief of systems engineering with Winder Transportation Systems, a subsidiary of Rohr Industries, in Winder, Ga. . . . PAUL E. JOHNSON is manager of corporate personnel service at Mead Corporation in Dayton, Ohio. . . . BRUCE G. WILLBRANT currently works as a system production engineer of track at Penn Central Transportation Co., Philadelphia, Pa.

1961

Married: ALVAH A. JAKOLA to Miss Concetta M. Aucello in Pleasantville, New York on August 3, 1974. The bride, a graduate of the University of the State of New York College of Education, teaches in Bedford, Mass. Her husband teaches mathematics at the Fox Lane Middle School, Bedford, and is also enrolled in the master's program at the University of Bridgeport in Connecticut.

1962

RICHARD L. LAZAR is a self-employed insurance agent in Bellaire, Texas. . . . Dr. JAMES D. QUIRK, associate professor at the University of New Hampshire in Keene, also serves as a swim coach. . . . JOHN M. SAMBORSKI is now superintendent at BASF Wyandotte, Wyandotte, Mich.

1963

Dr. ROBERT D. BEHN lectures for the physics department at Duke University, Durham, N.C. . . . Prof. JOSEPH MANCUSO of the management engineering department at WPI has been named chairman of the Management Engineering Constituent Committee, ASEE. In August his article, "How a Business Plan is Read," appeared in *Business Horizons*. . . . Combustion Engineering, Inc., has relocated A. EDWARD SCHERER back to Connecticut and promoted him to assistant project manager for a nuclear steam supply system currently under construction. Last summer he was elected to the national board of directors for Alpha Epsilon Pi Fraternity.

What you need is a left-handed skyhook

REMEMBER all those skyhook jokes? Pretty outlandish, weren't they? Well, the skyhook idea has leaped from the realm of the absurd right into the middle of reality, and Walt Adams, '63, helped to put it there.

Walt, who is with the Research, Development, Test and Evaluation Division of Naval Facilities Engineering Command, Chesapeake Division, has been researching the ship-to-shore aspects of container movement by (are you ready?) —balloon!

He claims that the balloon system is a money-maker and can provide a cheap and reliable means of transferring heavy cargo from ship to shore where there are no port facilities.

Currently the Naval Facilities Engineering Command is involved in the early phases of what promises to be a good alternative to current, multi-handling ship-to-shore delivery of containerized cargo and vehicles. In March of 1973, the Army, Navy, Air Force and Marines took part in exercises sponsored by the Defense Advanced Research Projects Agency in Oregon using a balloon system already employed by loggers, to simulate off-loading container ships.

The system consisted of three major components. The balloon was in reality a 530,000 cubic foot, 103 foot in diameter, helium filled skyhook capable of lifting net loads of 12 tons. The yarder had two winches capable of independent operation for moving the balloon up or down as well as back and forth, weighing in at a hefty 140,000 pounds. A caterpiller tractor served as flying dutchman, with the ability to pull the balloon laterally over the cell for insertion and extraction operations. Because of the mountainous terrain there was a limit of only 1,500 feet of horizontal distance between pickup point and the landing zone.

Engineers constructed a mock container cell and tilted it 2 degrees in pitch and 5 degrees in the roll. No more time was needed to place the spreader or containers in the cell than during previous at-sea exercises.

A complete test cycle consisted of placing the spreader in the cell, attaching to and removing the container, flying it 1,500 feet to the landing area, placing it within 1½ foot tolerances, and returning the spreader for another container. Skyhook trips averaged 5½ minutes for nine trials. Several variations were tried, such as moving the cell to the landing zone to simulate the yarder being on shore instead of near the container ship. Again it worked very well.

In a military system the balloon would be used with a faster and more powerful, but lighter yarder, and a winch for the flying dutchman. It is anticipated that with just one such system, cargo handlers could deliver a container across the beach to a point a mile away every six minutes. With slings, another minute could be saved.

There are three points which skeptics immediately raise. First is the vulnerability of balloons to enemy fire. The Air Force has had some experience in this area, which helps answer that charge. In 1968 a balloon escaped from Cape Kennedy and Air Force fighters scrambled to gun it down before it became a hazard to aircraft. They shot it and rocketed it, but couldn't bring it down. This was because of the low 2 pounds per square inch differential pressure across the balloon. Similar experiences with high altitude balloons occured in Vietnam. If, by chance, one were shot down, the holes can be easily repaired by the use of simple patches.

The second criticism concerns the ability of balloons to operate in bad weather. In Oregon it rained almost continuously, visibility was poor, and all communications with the yarder operator were by radio. Winds of 25 knots posed no problems. The only weather limitations for a balloon system are that it should be bedded down (one hour is needed) when winds hit 70 mph and during lightning storms. Under normal conditions the balloon need not be bedded down at night.

The third criticism leveled at the balloons is an alleged high cost. A total system, including the balloon, helium, yarder, flying dutchman equipment, lines, blocks and other paraphernalia would cost $1 million for a 45,000 pound capacity system. This compares favorably with the $1 million replacement cost of a single utility landing craft, which can solve only one part of the ship-to-shore delivery problem.

It is not only the military which is interested in the devleopment of the balloon delivery system. Several commercial companies are contemplating using such a method for delivery in undeveloped areas. It is hoped that the system will help solve the problem of unloading modern container ships when no ports and port facilities are available. One company plans to be logging from a river barge in South America within a year.

Balloons? Walt Adams says there are still many skeptics, but as more tests are conducted more converts are expected to support development of what appears to be a very promising delivery system. — The day of the skyhook is at hand!

1964

Dr. DAVID H. LAANANEN, formerly a senior engineer with Ultrasystems, Inc., Phoenix, Ariz., has been named assistant professor of mechanical engineering at Pennsylvania State University. His research has been concerned with vehicle safety, including crashworthiness and the biomechanics of vehicle injuries. . . . JAMES W. OLDZIEY was recently promoted to manager-planning and inventory control at the Fafnir Bearing Company, a division of Textron Incorporated, in New Britain, Conn. . . . FREDERICK H. SIFF has been awarded a PhD in operations research from New York University. He is a professor at George Mason University, a division of the University of Virginia.

1965

Married: RONALD G. GREENE and Miss Linda D. Gothorpe on August 24, 1974 in Lexington, Massachusetts. The bride graduated from Chandler School and works at RCA Corp., Burlington. The groom is employed by Data General Corporation in Southboro. . . . Capt. DAVID A. COOMBE (USA) is currently stationed at Kwajalein Missile Range. . . . Dr. DAVID SAWICKI is an associate professor and chairman of the department of urban planning at the School of Architecture, University of Wisconsin, in Milwaukee.

1966

Married: ALAN MOKSU to Miss Elizabeth A. Kane on August 17, 1974 in Boardman, Ohio. The bride, who attended Plymouth State College and the University of New Hampshire, is an art supervisor in Bedford, N.H. Her husband works at Sanders Associates in Nashua, N.H.

Born: To Mr. and Mrs. SIGMUND S. DICKER a son, Karl Frederick, on August 3, 1974. Sig is currently employed as a project manager at Whitler Contracting Company, Inc., Dix Hills, Long Island, N.Y.

BERTIS H. ADAMS III has been appointed a hydraulic environmental engineer at Stone & Webster Engineering Corporation in Boston. Associated with the firm since 1971, he is now involved in site selection studies, licensing activities, and hydraulic engineering for various types of power plants. He is a registered professional engineer. . . . DONALD P. GIVENS is presently a product manager at Envirotech in Salt Lake City, Utah. He is working on his MBA at the University of Utah. This year he had a paper published at the International Simulation Conference. . . . JOHN KOPCHIK, Jr., serves as a materials manager at Northwest Hardware, Inc., Portland, Oregon. . . . DANIEL J. MAGUIRE has joined Brisk Waterproofing Co., Inc., Needham Heights, Mass. . . . RAYMOND V. PIERCE works as a senior process engineer at Offshore Power Systems, Jacksonville, Florida

1967

Born: to Mr. and Mrs. JOHN ROGOZENSKI a son, Alexander, on December 19, 1973. John is still working at Natick Labs as principle investigator for systems analysis studies of military food service operations.

JOHN L. KILGUSS is a staff associate in the AT&T marketing department in New York City. . . . RENE B. LAPIERRE is presently a graduate student at WPI. . . . MAHESH M. VYAS has been awarded a patent for the invention of a method of reducing rolling mill roll wear. Currently, he, his wife and baby daughter, Sheila, are living in Bethlehem, Pa. where he is employed at Bethlehem Steel Corp. . . . JAMES WENTWORTH, a research engineer with the U.S. Department of Transportation at McLean, Va., has been named as one of the "Outstanding Men of America" for 1974. . . . HARRY E. TAYLOR, who graduated from the Harvard Business School in June, has accepted the position of marketing manager-exports for the fastener group of USM Corp. in Shelton, Conn.

1968

CHARLES A. GRIFFIN is a biochemist at LSU School of Medicine, department of biochemistry, Shreveport, La. . . . ROBERT G. KOHM serves as a process design engineer at Crawford & Russell, Stamford, Conn. . . . PETER E. KONOPA, who received his MBA from Wharton School (University of Pennsylvania) this year, works as a financial analyst at Ford Motor Company, Dearborn, Michigan. . . . JOEL S. SCHOENHOLTZ holds the position of plant manager at Custom Chemical Co., Elmwood Park, N.J. . . . WILLIAM R. TUOMI is assistant highway engineer for the California Department of Transportation in San Diego.

1969

Married: STEPHEN E. CARLSON and Mrs. Collette C. (Gover) Christie on September 21, 1974 in Worcester. The bride is employed by Educators Consultant Service, Inc., Shrewsbury. Her husband works for the same firm.

JOEL P. GREENE, a Worcester attorney, served as county coordinator in the campaign of Josiah Spaulding for attorney general. He was a research assistant in Spaulding's 1970 campaign against Senator Edward M. Kennedy.

1970

Married: JOHN J. GALE to Miss Mary E. Carr on September 14, 1974 in Worcester, Mrs. Gale, a graduate of Rollins College, Winter Park, Fla., substitute teaches in the Worcester school system. Her husband is a golf professional at Holden House & Country Club. . . . DANA L. LOUTH and Miss Theresa E. Radziemski on August 24 in Worcester. The bride is a graduate of Assumption College. The bridegroom is a planning engineer at Western Massachusetts Electric Co. in West Springfield. . . . LEONARD POLIZZOTTO and Miss Christina Comoroda on February 9, 1974 on Long Island, New York. PETER GROSCH, '69, and RALPH Di IORIO were ushers. The bride graduated from Rutgers and works for GE in Wellesley. Her husband is a quality improvement engineer for Polaroid Corp. in Waltham, Mass.

LTJG PAUL DRESSER, who is serving as a Navy pilot in the 7th Fleet aboard the carrier USS Midway, will be residing in Japan until next September. . . . EDWARD P. FOSTER works as a commercial development engineer at Air Products & Chemicals, Inc., Allentown, Pa. . . . JAMES P. TROUPES was recently appointed town engineer in Milford, Mass. Formerly he was chief of a survey party at the Moore Survey Mapping Corp. of Shrewsbury. Currently he is a staff sergeant in the Air National Guard as an aircraft control and warning radar technician.

1971

Married: ROBERT F. JOHNSON and Miss Deborah H. Lindquist on September 14, 1974 in Worcester. Mrs. Johnson graduated from the Memorial Hospital School of Nursing and is a registered nurse at Memorial. The groom works at Smith Valve Corp. . . . RAVINDRA M. NENE and Miss Meera Palanitkar in India on April 8, 1974. The bridegroom is with Burroughs Corp. in Paoli, Pa.

NORMAN D. POWERS and Miss Susan H. Mahler on August 3, 1974 in Worcester. Mrs. Powers graduated from Clark University and is a program analyst at American Optical Corp. in Southbridge. Her husband is a systems analyst at American Optical.

ROBERT C. BLAISDELL, who is on leave of absence from New England Power Co., Westboro, Mass., is doing graduate study in economics at the University of New Hampshire under a UNH fellowship. . . . Marine Capt. ALFRED J. CARAGANIS recently participated in infantry tactics training exercises on the island of Vieques, Puerto Rico. He serves with Company B, 1st Battalion, 6th Marine Regiment, Camp Lejeune, N.C. . . . JEFFREY P. LASSEY, now relocated in Worcester, has left the New England Electric System to become an electrical facilities engineer for Wyman-Gordon in Grafton, Mass. . . . RAVINDRA K. VORA is a works engineer at Otis Elevator Co., Bloomington, Ind. . . . MARTIN H. WOLF has been promoted to instrument specialist in residue analysis with the agricultural division of Ciba-Geigy Corporation in Greensboro, N.C. He is responsible for the repair and modification of analytical instrumentation. Prior to his promotion he was an associate synthesis chemist in metabolism support. He helped initiate

1975 ENGINEERING GRADUATES

SIKORSKY Helicopters help build a lot of things ...including exciting careers

Far more versatile than many people know, the helicopter provides scores of unexpected services. Specially designed craft by Sikorsky, for example, do workhorse chores in construction of many types. Frequently, they replace mobile cranes, and just as frequently perform heavy lifting tasks more effectively.

In the area of commercial, industrial and public service applications, VTOL (Vertical Take-off and Landing) craft is virtually in its infancy. Supporting technology, too, still presents wide areas for exploration and long term development.

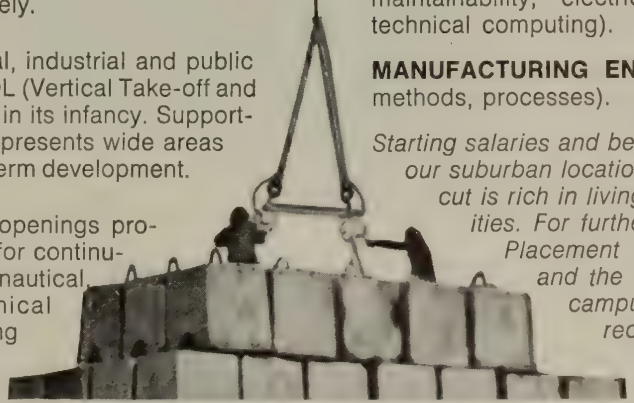
Currently, Sikorsky has openings providing strong prospects for continuing career gains for Aeronautical, Electrical and Mechanical Engineers in the following areas:

DESIGN (aircraft structures; propulsion systems; transmissions; rotor, hydraulic & flight control systems; electrical/electronic systems).

TEST AND ANALYSIS (structural, loads, dynamic, stress, mass properties, reliability/maintainability; electrical/electronic systems; technical computing).

MANUFACTURING ENGINEERING (planning, methods, processes).

Starting salaries and benefits are excellent. And our suburban location in Stratford, Connecticut is rich in living and cultural opportunities. For further information, see your Placement Office for our brochure and the date of our forthcoming campus interviews. Or write directly to Mr. Leo J. Shalvoy, Professional Placement.



Sikorsky Aircraft

DIVISION OF UNITED AIRCRAFT CORP.

STRATFORD, CONNECTICUT 06602

An Equal Opportunity Employer M & F

SYLVANIA'S FLAT RESPONSE TO HIGH PRICES.

ANNOUNCING THE NEW SUPER AS 210 A. ONLY $99.95*.

Our new speaker gives you a power frequency response that's flat (±3db) all the way from 33Hz to 15,000 Hz.

Your ears will also be grateful for what it *doesn't* give you.

There's no bass boom acting as a poor substitute for good low-end response.

There are no high-frequency peaks providing phony brilliance at the treble end.

In sum: no exaggeration of highs or lows.

How did we do it?

By making significant improvements in a two-way ten-inch—one of the most thoroughly researched speakers.

You get a deluxe 10″ woofer with a powerful 1-lb., 9-oz. ceramic magnet. A 1½″ voice coil epoxy-bonded to the speaker cone for outstanding power handling. A 1½″ Mylar dome mid/tweeter with a hefty Alnico V magnet. Sealed air-suspension, of course. And much more.

What you hear is an extremely accurate copy of the original audio input.

At $99.95, we think you'll find that our SUPER AS 210 A is one of the best values on the market today.

For details, see your Sylvania dealer. Or write to: GTE Sylvania, 700 Ellicott St., Batavia, N.Y. 14020.

*Manufacturer's suggested retail price.

GTE SYLVANIA

explorer scouting posts in chemistry at the firm's laboratory facilities in Ardsley, N.Y. and Greensboro, N.C. This year he received his MA in physical chemistry from Yeshiva University. . . . CRAIG C. LAZENBY, a project engineer currently located in Worcester, has been doing remodeling work as a self-employed contractor.

1972

Married: JEFFREY S. HUNTER and Miss Lisa A. Williamson on September 7, 1974 in Worcester. The bride, a secretary at Astra Pharmaceutical Products, Inc., graduated from Salter Secretarial School. Her husband is with Riley Stoker Corp. . . . STEPHEN C. JOSEPH to Miss Wendy J. Weake in West Springfield, Massachusetts on August 24, 1974. Mrs. Joseph graduated from Becker and works for Jaffee Associates in Worcester. The bridegroom is with New England Telephone Co., Boston. . . . ALFRED J. LEBEL to Miss Mary J. Soldolski last summer in Norwich, Connecticut. The bride, a rating analyst, attended the University of Connecticut in Storrs. Her husband is an actuarial analyst. . . . DAVID J. McGORTY and Miss Carlene Bloomberg of Granville, Massachusetts on August 31, 1974. Mrs. McGorty attends Newbury Junior College. The bridegroom is with Raytheon. . . . FRANK D. MCMAHON to Miss Leslie J. Clark on September 14, 1974 in Stony Creek, Connecticut. The bride graduated from Becker Junior College and has an AS degree in retailing.

DANIEL L. DAVID has been named supervisory engineer of the environmental and safety activities staff for Saab-Scania of America, Inc., Orange, Conn. He will be responsible for coordinating federal and state regulations and compliance activities for the Swedish car manufacturer. . . . BRENNAN R. MCLAUGHLIN, who recently received his MSCE from WPI, is now associated with Stone & Webster, Boston, the second largest nuclear power energy designing plant in the U.S. . . . THOMAS O. MURPHY serves as a manufacturing engineer at Brunswick Corporation, Westboro, Mass. . . . GARY RAND is employed at GTE-Sylvania in Needham, Mass., where he is working on the circuit switch for a telephone network. . . . THOMAS A. REYNOLDS holds the post of placement director at the Scientific Placement Co., Houston, Texas.

1973

Married: Miss ALLISON J. HUSE and BRUCE E. NUNN on January 12, 1974. Mrs. Nunn is employed as a research assistant at Ensign-Bickford Company, Simsbury, Conn. The groom is the mill chemist for Strathmore Paper Co. (a division of Hammermill Paper) at the company mill in West Springfield, Mass. . . . KENNETH P. LEVY to Miss Joanne Beth Shor on June 30, 1974 in Worcester. The bride graduated from the University of Massachusetts and is a health educator in the Worcester public school system. Her husband is with the Kidde Merchandising Equipment Group of South Windsor, Conn. . . . JOHN J. MURTAGH and Miss Catherine E. Cunningham in East Hartford, Connecticut on August 3. Mrs. Murtagh graduated from Annhurst College. The bridegroom is employed by IBM in Fishkill, N.Y. . . . DWIGHT D. SULLIVAN to Miss Dale C. Anderson of Franklin, Massachusetts on August 17, 1974. The bride is a licensed practical nurse. Her husband is a process engineer for IBM in Essex Junction, VT. . . . DAVID G. WATTS to Miss Gail Ann Hunt in Windsor, Connecticut on September 7, 1974. The bride is a Becker graduate and a legal secretary. The groom is with Central Vermont Public Service Corp. in Rutland.

. . . DAVID G. WATTS to Miss Gail Ann Hunt in Windsor, Connecticut on September 7, 1974. The bride is a Becker graduate and a legal secretary. The groom is with Central Vermont Public Service Corp. in Rutland.

Currently ROBERT AKIE serves as a graduate assistant at WPI's Alden Research Labs. . . . LEO BUCHAKJIAN is with General Electric in Schenectady, N.Y. . . . RAYMOND F. CHERENZIA is a graduate assistant in the civil engineering department at WPI. . . . WILLIAM P. COTTER, a teaching assistant in the math department at WPI, is studying for his master's degree. For the past year he has been employed as a test engineer at Sikorsky Aircraft Corp., Stratford, Conn. Prominent in chess circles, he earned the title of Fairfield County Chess Champion for 1973-1974. . . . RICHARD F. SILVESTRIS works for Monsanto in Bloomfield, Conn. . . . MARK E. MOORADIAN, who recently received his master's degree from Harvard University, is now teaching at Tehran International School in Iran.

1974

Married: BRIAN E. ANDERSON and Miss Claudia J. Stuart on August 10, 1974 in Clinton, Massachusetts. The bride, a graduate of Atlantic Union College and the New England Memorial School of Medical Technology, is employed by the Worthington Biochemical Research Laboratory in New Jersey. The bridegroom is with the McPherson Instrument Company of Acton, Mass. . . . ROGER L. BERTOLINI to Miss Rosalie D'Amato on September 20 in New Haven, Connecticut. Mrs. Bertolini attended Quinnipiac College. Her husband is a licensed broadcaster. . . . EARLE A. BROWN to Miss Linda N. Abou-Adal on August 17, 1974 in Worcester. The bride attended Quinsigamond Community College and works for the *Worcester Telegram* and the *Evening Gazette*. The bridegroom is employed by Jamesbury Corp. . . . DANIEL J. BRUNELL and Miss Sherry Ann Surowitz in West Orange, New Jersey on August 11, 1974. Mrs. Brunell is employed at Somerset Valley Nursing Home, Somerset, N.J. Her husband is a graduate student in industrial engineering at Rutgers. . . . LEONARD J. BRZOZOWSKI and Miss Mary A. Michaud of Bristol, Connecticut on September 7, 1974. Lee Turner served as best man and Garry Balboni and John Young as ushers. The bridegroom is now at Tuck School, Dartmouth College, Hanover, N.H.

Married: ANTHONY T. CAPPUCCIO to Miss Gail A. Fierro on August 24, 1974 in North Adams, Massachusetts. Mrs. Cappuccio graduated from Becker and is a legal secretary. The groom is a staff scientist-mathematician at Environmental Research and Technology, Lexington, Mass. . . . JOHN D. CHIPMAN and Miss Betsy E. Marshall in Fitchburg, Massachusetts on August 24, 1974. The bride graduated from Anna Maria College and teaches music in the Norwood schools. The bridegroom works for GTE-Sylvania in Needham, Mass. . . . MICHAEL J. KOZAKIEWICZ and Miss Diane N. Fontaine in Worcester on September 14, 1974. The bride graduated from Quinsigamond Community College and is a secretary. Her husband is a chemist for Eastman Kodak Co., Rochester, N.Y. . . . Miss MARGARET A. MORIARTY and Harry J. Staruk, Jr., on June 15, 1974 in Ware, Massachusetts. The groom, a graduate of

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

Worcester State, is employed at Phalo Corp./ Transitron, Shrewsbury, Mass. . . . KEVIN F. NAUGHTON and Miss Sandra J. Shirlock on September 21, 1974 in Torrington, Connecticut. The bride is a senior at Lesley College, Cambridge, Mass. Her husband is with Stone & Webster Corp., Boston.

Married: JONATHAN G. NEWMAN and Miss Sherry Ann Roffman on August 10, 1974 in Wakefield, Massachusetts. The bride, a graduate of Simmons College, is organist and choir director for the Unitarian-Universalist Church of Wakefield. The groom is an electrical engineer with the Cottrell Company, a division of Harris Intertype Corp., Pawcatuck, Conn. . . . HUGH B. O'DONNELL and Miss Gail Linderme of Portland, Connecticut on July 27, 1974. The bridegroom works in the housewares business division of General Electric in Bridgeport, Conn. . . . EDWIN O. WILES to Miss Mona E. Dietel on August 3, 1974 in Clinton, Massachusetts. Mrs. Wiles, a teacher, graduated from Westfield State College. Her husband works as a structural engineer at Stone & Webster, Boston. . . .

ANN E. ANDERSON is a graduate student at the University of North Carolina at Chapel Hill . . . JOHN E. BARNES works for Combustion Engineering Corp., Windsor, Conn. . . . DAVID W. BLACK has joined Dow Chemical U.S.A. at Gales Ferry, Conn. . . . DAVID M. CARDOS has been employed by Digital Equipment Corp. in Maynard, Mass. . . . JAMES L. CARR, Jr. works for H. Carr & Sons, Lincoln, R.I. . . . WILLIAM A. DELPHOS is a graduate student at Northwestern University, Evanston, Ill. . . . Camp Dresser & McKee, Boston, has employed EDWARD S. DLUGOSZ. . . . JOSEPH DOWNEY is teaching in the science department at Walpole (Mass.) High School. . . . MARK W. DOWNING has joined E. I. duPont de Nemours & Co., Wilmington, Delaware. . . . EDWARD P. FLANIGAN is with Allied Chemical Corp., Morristown, N. J. . . . JOHN R. GILGIS works for Data General Corp., Southboro, Mass.

GORDON D. GOVER is employed at American Cyanamid Co., West Springfield, Mass. . . . WAYNE M. BRYANT and ALAN J. KIRBY work at American Can Co., Fitchburg, Mass. . . . ROBERT S. GRONDALSKI has been employed by Digital Equipment Corp., Maynard, Mass. . . . CHARLES A. JUTRAS is now with Camp Dresser & McKee in Boston. . . . Farrel Corp. of Ansonia, Conn. has employed EDWARD T. KAMINSKI. . . . DAVID G. LAPRE is with Charmin Paper Products Co. in Mehoopany, Pa. . . . ROLAND A. LARIVIERE has joined General Dynamics/Electric Boat Division in Groton, Conn. . . . JOHN E. O'CONNELL works for Haley & Ward, Inc., Waltham, Mass. . . . Union Carbide Corp. Bound Brook, N.J., has employed GERARD F. PETIT. . . . LOUIS J. PISCITELLE is an employee of Pratt & Whitney Aircraft (Div. of UAC), East Hartford, Conn. . . . MICHAEL W. PONTBRIAND works at the Badger Co. in Cambridge, Mass. . . . STEPHEN J. POWLISHEN has a position in the industrial products division at Hamilton Standard in Windsor Locks, Conn. . . . ROBERT F. PRAINO is with Stone & Webster, Boston.

STANLEY R. PURINGTON has been employed by Electric Boat, Groton, Conn. . . . STEPHEN E. RUBIN is with Foxboro (Mass.) Co. . . . DAVID J. RYBACKI is associated with Allis-Chalmers, Boston. . . . PAULA ANN SABAJ is working for American Optical Corp., Southbridge, Mass. . . . BALTASAR SANCHEZ is doing graduate work in the chemical Engineering department at Virginia Polytechnic Institute in Blacksburg, Va. . . . PAULA A. SEARS works for General Electric in Schenectady, N.Y. . . . Turner Construction Co., Boston, has employed JAMES W. SGROI. . . . SCOTT A. SIMPSON has joined the mechanical drive turbine products department of General Electric Co. in Fitchburg, Mass. . . . DEAN F. STRATOULY and ALAN MIKUS are with Stone & Webster in Boston. . . . JOSEPH R. STREMPEK works for Babcock & Wilcox, New York City. . . . SHELDON I. STRICKER and KARL A. SWENSON have joined Stone & Webster Engineering, Boston. . . . NORMAN P. SZAMOCKI is associated with Bethlehem Steel Corp. . . . Monsanto Polymers & Petrochemical Co., Indian Orchard, Mass., has employed MICHAEL W. SZTELIGA.

MICHAEL C. TANCA works at Combustion Engineering, Windsor, Conn. . . . Currently PETER A. THACHER is with Ciba-Geigy of Cranston, R.I. . . . PETER W. TUNNICLIFFE is employed by Camp Dresser & McKee of Boston. . . . CHARLES M. WALDRON has joined Union Mutual Life Insurance Co. in Portland, Me. . . . PETER WALWORTH is a student at Northeastern University, Boston. . . . BRUCE A WEBSTER is employed at the Bettis Atomic Power Lab. (Westinghouse Electric Corp.) in Springfield, Mass. . . . HELEN C. WEIMERSKIRCH is employed at Stone & Webster Engineering Corp. . . . ANDREW P. WEMPLE is associated with State Mutual Life Assurance Co., Worcester. . . . BRAD R. WETZEL has a position with United Engineers & Constructors, Inc., a subsidiary of Raytheon, in Philadelphia. . . . DAVID P. WHITNEY works at Gibbs, Hill, Durham & Richardson, Inc., in Omaha, Neb. . . . MARK J. WHITNEY is with Stone & Webster, Boston.

Digital Equipment Corp., Maynard, Mass., has employed CHRISTOPHER L. WILLIAMS. . . . STEPHEN B. WILLIAMS works at General Electric Co. in New York City. . . . SANDRA N. WILSON is currently at the Allyn's Point Plant of Dow Chemical U.S.A. in Gales Ferry, Conn. . . . JAMES WONG, Jr., is an employee of Texaco Inc., Beacon, N.Y. . . . STANLEY W. WOOD, Jr. is associated with the Naval Facilities Engineering Command in Philadelphia. . . . Presently GORDON G. WOODFALL is with Fafnir Bearing Co., New Britain, Conn. . . . BRUCE T. WORK has joined Work Electrical Co., Hartford, Conn. . . . BARRY S. YOUNG is an employee at Masoneilan International, Inc., in Norwood, Mass. . . . JOHN W. YOUNG is currently with Charmin Paper Products Co., Mehoopany, Pa. . . . LARRY MARTINIANO and TOM SPENCE have joined Stone & Webster in Boston.

INTERSESSION

Spend January at WPI with us. Explore a new interest, an old interest, a professional or technical area, or a social concern. For details and a complete catalog, write the Office of Continuing Education, 310J Boynton Hall, WPI, Worcester, Massachusetts 01609.

ALLAN W. FORBES, '10, of Worcester, died suddenly on September 27, 1974. He was 88.

He was born on June 20, 1886 in Westboro, Mass. After graduating as an electrical engineer from WPI, he joined Westinghouse Electric & Mfg. Co. He then worked for a year at Crocker Wheeler Co.

From 1913 until 1959 when he retired, he was a partner and owner of Forbes & Myers in Worcester.

Dr. HARLAND F. STUART, '12, a professor emeritus in engineering at the University of Rhode Island, passed away on August 25, 1974 in Gettysburg, Pennsylvania.

He was born on October 3, 1889 in Holyoke, Mass. After graduating as a mechanical engineer, he was an instructor at Tech until 1915. Later he served as director of Hillyer Institute (now Hartford College), and as president of Central Philippine College (now a university) while he and Mrs. Stuart were missionaries with the American Baptist Foreign Mission Society. From 1939 until 1942 he held the post of Dean of the School of Technology at Billings (Montana) Polytechnic Institute. From 1942 until he retired in 1959, he was a professor of mechanical engineering at the University of Rhode Island.

Dr. Stuart held EdM AND EdD degrees from Harvard University and an honorary LLD degree from Central Philippine University. He belonged to ASME, ASEE, AAUP, Phi Delta Kappa, Phi Kappa Phi, Tau Beta Pi, and Sigma Xi. He served as a past president of the Gettysburg Photographic Society and was a member of the Civil War Round Table and Adams County Historical Society. A registered professional engineer in the state of Rhode Island, he was also the father of David A. Stuart, '46.

ROGER P. TOWNE, '12, passed away on August 20, 1974 in Concord, New Hampshire.

From 1912 until his retirement in 1950, he was a field engineer for Western Union Telegraph Co., New York City. He was born in Topsfield, Mass. on June 1, 1890. In 1912 he graduated as an electrical engineer from WPI.

FRANK G. GIFFORD, '16, a retired works manager of the abrasives division at Norton Co., Worcester, died on September 21, 1974 in Hyannis, Massachusetts. He was 70 years old.

A native of Swansea, Mass., he was born on June 7, 1894. In 1916 he received his BSME from WPI. In 1920 he began as a time-study engineer at Norton and was appointed head of the methods department in 1929. He became a methods engineer in 1943 and in 1948 was promoted to manager of the wheel plants. In 1956 he retired as works manager.

Mr. Gifford was a member of Alpha Tau Omega, Tau Beta Pi, and was a World War I veteran.

JOHN A. DUFAULT, '24, of Hendersonville, North Carolina, died on September 9, 1974 after an extended illness.

A native of East Douglas, Mass., he was born on June 23, 1900. In 1924 he graduated as an electrical engineer from WPI. During his lifetime he was associated with the Cleveland (Ohio) Union Terminals Co. and Leeds & Northrup Co., Cleveland, where he worked for many years as a sales and field engineer.

Mr. Dufault, a past secretary-treasurer of the Cleveland alumni chapter, was a member of Sigma Xi and the Cleveland Engineering Society.

ROY B. PAYNE, '25, a retired engineer for the Massachusetts Electric Co., died on September 24, 1974 in Worcester. He was 71.

He was born on April 12, 1903 in Ludlow, Mass. After graduating as an electrical engineer from WPI, he joined General Electric Co., in Schenectady, N.Y., where he worked as a student engineer and section head. From 1928 until 1932 he was a sales engineer for GE in Philadelphia.

For two years he operated his own business in Worcester and then became associated with New England Power Co. In 1941 he was promoted to assistant engineer. During World War II he worked for the U.S. War Production Board in Washington, D.C. After the war he became an engineer at Massachuestts Electric Co., Worcester. He retired in 1968.

Mr. Payne belonged to AIEE and the Worcester Engineering Society. He was a registered professional engineer in Massachusetts and a long-time senior warden of St. Mark's Episcopal Church.

ABRAHAM ROSENBLOOM, '25, died on August 17, 1974 at his home in Worcester. For 37 years he was an insurance agent for Prudential Life Insurance Co. Last year he retired after five years as a salesman for Hersh Neckware Co. Mr. Rosenbloom was born on Feb. 28, 1904 in Russia and graduated with a BSEE from WPI in 1925.

GEORGE V. STYFFE, '28, of Worcester, Massachusetts passed away in July. He was 68 years old. He was born on May 2, 1906 in Worcester and later attended WPI. For many years he was a sales engineer at Norton Co. He was a member of Phi Sigma Kappa Fraternity.

ANDREW G. TOUSSAINT, '28, of Agawam, Massachusetts died in August at the age of 68.

A native of New Milford, Conn., he studied at WPI and graduated as an electrical engineer in 1928. He was associated with Westinghouse Mfg. Co., Springfield Commercial Body Co., and Transport Equipment Co., Int., Inc., South Norwalk, Conn.

Mr. Toussaint was a vice president of the Connecticut Valley Mineral Society, a life member of the National Rifle Association, and belonged to TUO (now Sigma Phi Epsilon fraternity).

FREDERICK H. AYERS, '38, died in Holyoke, Massachusetts on September 2, 1974 at the age of 59. Born in Haverhill, Mass., on August 14, 1915, he later studied at WPI. During most of his adult life he was in the paper business and until his retirement several years ago, he was superintendent of the Franklin Paper Co. Mr. Ayers belonged to TAPPI and PIMA, national paper organizations.

ROGER C. SQUIRE, '38, of Swansea, Massachusetts, passed away on September 18, 1974 following a long illness.

He was born in Somerset, Mass. on August 29, 1916, later studying at WPI. From 1944 until 1962 he owned and operated Swansea Boat Yard. After working a short time at Norwood Chris Craft, he then owned and operated Aquidneck Island Marine in Middletown form 1964 until his retirement in 1972.

A World War II veteran of the Army Air Corps, he served as a flight instructor in Waterville, Me., and taught aviation ground school at Colby College.

Mr. Squire, who also attended the University of Alabama, was a member of Sigma Alpha Epsilon fraternity. He was a past president of Fall River Rod and Gun Club and a member of the Swansea Police Association.

ALVIN M. ALDRICH, '41, died suddenly in Phoenix, Arizona on August 29, 1974 while visiting his brother. He was 56. He was born in Omaha, Neb., on December 8, 1918. After studying at WPI, he became associated with W.H. Nichols Co., Waltham, Mass., where he was employed as a metallurgic engineer for 36 years. He belonged to Sigma Phi Epsilon Fraternity.

EDWARD A. WOLFE, '52, a former pilot for United Air Lines, was killed (with his wife) in a Pan American Airways crash on April 20, 1974 in Bali, Indonesia. He was 43 years old.

A practicing attorney in the San Francisco Bay area, he was also a chemical engineer. He established and equipped the first pollution laboratory for the city of San Francisco and wrote the guidelines which inspectors use for enforcing the pollution laws. He was appointed by the governor to the California State Pollution Board.

Mr. Wolfe was born in Boston, Mass. on May 19, 1931. After graduating with a BS in chemical engineering from WPI, he worked at Koppers Company, Inc., Pittsburgh, Pa. and served as an aviator for four years with the U.S. Navy. He then became chief of source testing for the Bay Area air pollution control district. After being associated with the chemical firm of Abbot A. Hanks, Inc., in 1962 he graduated from the University of San Francisco Law School. He then became a flight officer for United Air Lines. At the time of his death he was practicing law in San Francisco.

Mr. Wolfe, who was a member of Alpha Epsilon Pi, was enroute to Australia with his wife when the air disaster occurred.

JOHN J. AMERO, SIM '56, passed away on March 16, 1974 in Worcester at the age of 57.

A native of Gloucester, Mass., he later graduated from the School of Industrial Management at WPI. For 26 years he was assistant director of research in the vitrified bonding unit of Norton Co. in Worcester.

During World War II he served in the Navy at the naval torpedo station in Newport, R.I. He was a member of the Worcester Economic Club and the Norton 25-year Club.

JACQUES R. BELAIR, '61, of West Hurley, New York, died on January 22, 1974. He was born on September 9, 1939 in Woonsocket, R.I. After studying electrical engineering at WPI, he joined the Air Force and was stationed at Griffiss AFB in Rome, N.Y.

U S POSTAL SERVICE

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

(Act of August 12, 1970 Section 3685 Title 39 United States Code)

SEE INSTRUCTIONS ON PAGE 2 (REVERSE)

1 TITLE OF PUBLICATION: W P I Journal

2. DATE OF FILING: September 28,1974

3 FREQUENCY OF ISSUE: 6 times per year (Aug., Sept., Oct., Dec., Feb., April)

4 LOCATION OF KNOWN OFFICE OF PUBLICATION *(Street, city, county, state, ZIP code) (Not printers)*: Institute Road, Worcester, Worcester County, Massachusetts 01609

5. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS *(Not printers)*: Institute Road, Worcester, Massachusetts 01609

6 NAMES AND ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR

PUBLISHER *(Name and address)*: Worcester Polytechnic Institute, Worcester, Massachusetts 01609

EDITOR *(Name and address)*: H. Russell Kay, Worcester Polytechnic Institute, Worcester, Massachusetts 01609

MANAGER EDITOR *(Name and address)*: None

7 OWNER *(If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.)*

NAME	ADDRESS
Worcester Polytechnic Institute	Worcester, Massachusetts 10609

8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES *(If there are none, so state)*

NAME	ADDRESS
None	

9. FOR OPTIONAL COMPLETION BY PUBLISHERS MAILING AT THE REGULAR RATES (Section 132.121, Postal Service Manual)

39 U S C 3626 provides in pertinent part "No person who would have been entitled to mail matter under former section 4359 of this title shall mail such matter at the rates provided under this subsection unless he files annually with the Postal Service a written request for permission to mail matter at such rates."

In accordance with the provisions of this statute, I hereby request permission to mail the publication named in Item 1 at the reduced postage rates presently authorized by 39 U. S. C. 3626

(Signature and title of editor, publisher, business manager, or owner)

10. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES *(Section 132.122, Postal Manual)*

(Check one)

The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes: ☑ Have not changed during preceding 12 months ☐ Have changed during preceding 12 months *(If changed, publisher must submit explanation of change with this statement.)*

11. EXTENT AND NATURE OF CIRCULATION	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NUMBER OF COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES PRINTED *(Net Press Run)*	16,250	15,000
B. PAID CIRCULATION 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES	-	-
2. MAIL SUBSCRIPTIONS	2	2
C. TOTAL PAID CIRCULATION	2	2
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS 1. SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	15,031	13,267
2. COPIES DISTRIBUTED TO NEWS AGENTS, BUT NOT SOLD	-	-
E. TOTAL DISTRIBUTION *(Sum of C and D)*	15,033	13,269
F. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING	1,217	1,731
G. TOTAL *(Sum of E & F - should equal net press run shown in A)*	16,250	15,000

I certify that the statements made by me above are correct and complete

▶ *(Signature of editor, publisher, business manager, or owner)* H Russell Kay

PS Form 3526 July 1971

Your B.S. or M.S. in engineering is your ticket.

Now where do you want to go?

PLACE: Rochester, N.Y. ☐ Kingsport, Tenn. ☐ Windsor, Colo. ☐ Longview, Tex. ☐

Columbia, S.C. ☐ No one locality for too long ☐

FUNCTION: Designing . . .

products ☐ processes ☐ production methods ☐

production equipment ☐ facilities ☐

Keeping the factory running ☐

Research . . .

fundamental ☐ not so fundamental ☐

GOAL: To be regarded by technical colleagues as an authority . . .

for depth of knowledge ☐ for breadth of knowledge ☐

in the fields of .....

☐ To understand our products from the standpoint of users and thereby as a marketer combine technological competence with a strong interest in people

☐ To acquire through personal accomplishment in a technical job the knowledge of our business to handle administrative assignments competently

Mark your preferred route.
You might even send it in to us.
Find out if the route is open.
Let's communicate.
Write us at Business and Technical Personnel,
Eastman Kodak Company, Rochester, N.Y. 14650.

Kodak

An equal-opportunity employer f/m

THE CLASS OF '25

50TH REUNION COMING UP IN JUNE. DON'T MISS IT!

FEBRUARY 1975

WPI journal

Wyman-Gordon Energy-Saving Campaign Aids Community and Company

The saving of gas, oil and electricity in W-G's energy reduction campaign would supply the needs of some 1,500 to 2,000 homes. And our campaign continues to grow.

As energy shortages deepen, conservation by each user helps ease the crunch for everyone. W-G's effort not only increases company efficiency but can be important to the Worcester area.

Our energy campaign has another benefit also; by rigorous control of all costs — energy is one of W-G's significant costs — we strengthen our competitive ability to maintain sales, production and employment. In these times of business slowdown the community needs all its industries operating as fully as possible.

Metal processing requires a lot of gas, oil and electricity; we're one of the largest users in New England. Our operations have increased and we've been installing improved pollution control equipment which takes additional power. But at the same time we've reduced our energy use some 15%, and are still making progress.

Government Agencies Issue Warnings

The Federal Energy Administration and other agencies, both government and private, are giving plenty of warning on the ways we'll all be affected by the world energy situation. No matter who is to "blame" or how many interpretations come at us from politically motivated sources the problem is real, and we have to learn to live with its implications as they confront us day to day.

At W-G the FEA tells us we can't increase oil usage over last year unless: 1) we can unequivocally *prove* our need; and 2) we have a well-established and effective conservation program. The gas company tells us there's a real possibility of cutback in gas supply to W-G. This area is at the farthest end of the pipelines from the gas fields; weather and supply problems almost anywhere in the country can affect the supply here. Electric power supply seems OK for this year, but since much of our power is generated from high-priced imported oil the supply picture could change, and certainly prices will continue high.

Therefore, to keep up production, provide service to customers and maintain employment, our conservation campaign absolutely must continue as a top priority effort for all.

Twin Energy Problems are Here to Stay

The twin troubles of escalating cost and limited supply will be with us for a long, long time.

They affect industry just as they affect homes. They mean changing accustomed ways of doing things, increased inconvenience and discomfort, attention to details we used to overlook, continual search for new ways to economize, significantly altering our living habits. These are now a permanent part of our industrial and personal way of life.

This isn't news, although some people still try to pretend it's unreal or will disappear if they look the other way. What we think *is* news is the fact that it doesn't have to be all gloom, frustration and impossible. Our people have made great strides in meeting the facts head on, have taken on some inconvenience and many changes, and are steadily working to accomplish more.

Ways W-G Saves Gas, Oil and Electricity

Many steps have been taken and others are on the way. Some of them are:

1. We removed electric lights and bulbs where not indispensable for acceptable minimum-level lighting for work. The total taken out was over 1,000,000 watts. This is the equivalent of 20,000 50-watt bulbs. . . or 500,000 electric clocks, or 7,000,000 night lights!

2. Lights and motors are turned off when not in immediate use. This seems an obvious idea, but it's not easy to accomplish; it takes added thought and attention by many people to make it work. Under the new facts of cost and limited supply it's worth the effort.

3. Thermostats are set lower, and windows and ventilators are more carefully controlled. Again requiring attention and cooperation of many people.

4. New expansion joints were installed in steam heating lines. This provides increased flexibility of heating control in the plant without undue stresses in the steam piping system.

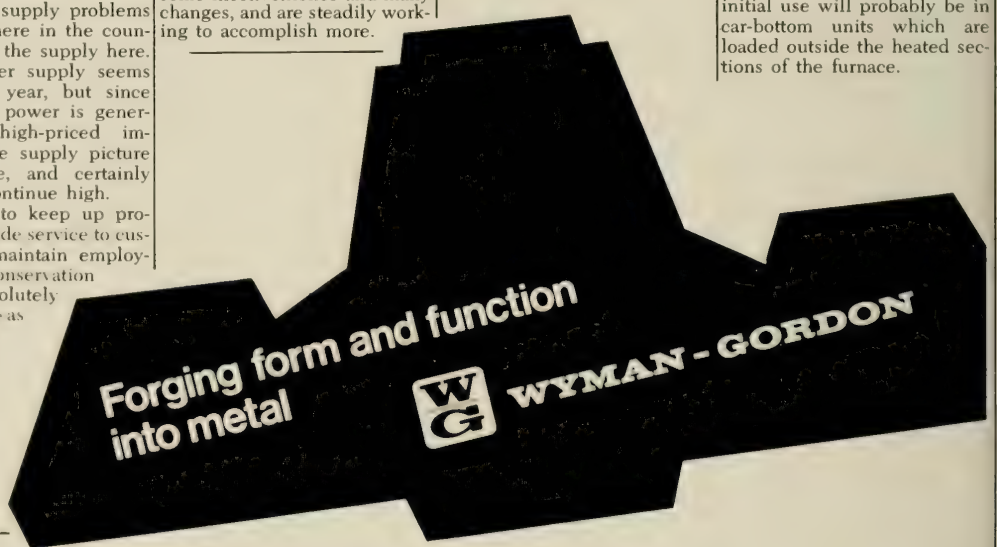
5. New gas furnaces are designed with "recuperators" which use hot exhaust gases to preheat incoming combustion air going to the furnace burners. They can reduce gas consumption some 15%. However, they're expensive and previously couldn't be justified on a cost-payback basis. But now they are justified by the new facts of decreased supply and increased prices.

6. Improved insulation is being maintained on certain structural members in Grafton gas furnaces. This change by itself will eventually save enough gas to supply several hundred gas-heated homes.

7. We are experimenting with changing furnace linings from firebrick to fiber blanket. This permits faster heating and cooling without cracking the lining and also takes less gas in startup to get the furnace to operating temperature. The total saving can be as much as 15%. However, the fiber lining is more costly to install and is easier to damage when loading or unloading the furnace. Its initial use will probably be in car-bottom units which are loaded outside the heated sections of the furnace.

These are some of the steps we've taken. Ideas come from everywhere and everyone. The Committee acts as collector and coordinator as well as initiator.

If you have any suggestions or would like to discuss any part of our energy campaign we will appreciate hearing from you. Please get in touch with our Committee chairman, Tom Carlin. You can phone him at 839-4441 or write to him, Wyman-Gordon Company Worcester, Mass. 01601.



W-G Initiated Program Almost Two Years Ago

Our Energy Committee was formed in early 1973 to focus attention on stringent control of gas, oil and electricity, the Big Three energies vital to our operation. This was months before the energy crisis was generally recognized, and our Committee was one of the first of its kind anywhere in the country.

The Committee includes T. R. Carlin, Purchasing; J. J. Connealy, Production; R. J. Donley, Energy Engineer; G. L. Durfee, Facilities Engineering; R. F. Goodspeed, Plant Engineering; Michael Hopper, Data Processing; J. P. Molony, Quality Assurance; J. M. Mullaly, Accounting and L. P. Pouliot, Plant Engineering. Ray Donley, an experienced W-G engineer, was assigned full time to the effort.

Supply shortages and price increases were expected and we hoped for some relief through the work of the new Committee. But we certainly didn't anticipate how drastic the shortages or how astronomical the prices would be, nor did we realize how truly significant the conservation campaign could be

Thanks To Our People It's Working

Energy saving in industry, just as at home, requires the interest, cooperative understanding and attention to detail of everyone. No individual or committee can do the job alone.

We're proud and appreciative of the support all our people have given this campaign. The record proves it; such accomplishment is impossible without it.

WPI journal

Vol. 78, No. 5 February 1975

3 On the hill

4 Feedback

6 Q: What does a liverwurst have in common with a blood vessel?
A look at some of the realities of project work going on at the WPI Internship Center at St. Vincent Hospital

14 "There was a young lady from Becker . . ."
The printable results of the Pub's recent limerick contest

16 Dick Whitcomb: NASA's aerodynamic genius does it again

18 Dave Emery goes to Congress, maybe

20 Your Class and Others

30 Completed Careers

36 What's happening at WPI?
A new section listing future events, on campus and off, for interested readers

The cover: A liverwurst by any other name . . . Photograph by the editor

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, *chairman;* Donald F. Berth, '57, Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev. Edward I. Swanson, '45

Design: H. Russell Kay

Typography: Typesetting Service, Providence, Rhode Island

Printing: Davis Press, Worcester, Massachusetts

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1975 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster:* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI Alumni Association

President: W. J. Bank, '46

Vice President: F. S. Harvey, '37; W. A. Julian, '49

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr. '44

Executive Committee Members-at-large: B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55; L. Polizzotto, '70

Fund Board: W. J. Charow, '49, *chairman;* L. H. White, '41; G. A. Anderson, '51; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

by the editor

Do you suppose there's a group rate for recruiting students?

It was the day after Christmas and Roy Seaberg, '56, was minding the store in the admissions office. The telephone rang, with the question of whether WPI could house and help teach English to a group of Venezuelan students, sponsored by their government, who would then be regular undergraduates.

On January 23, twenty men and one woman arrived from Caracas via New York. Some of the students had seen their first city, Caracas, just the week before. None of them could speak much if any English. And they were not prepared for New England in the wintertime.

During the four weeks between phone call and arrival, a whole program for winter and spring terms was organized. Prof. Donald Johnson, head of the Humanities Department, arranged for Holy Cross professor Charles Tatum and WPI lecturer Kay Draper to teach the Venezuelans English, using Holy Cross's language laboratory and student tutors. English studies will take up about two-thirds of the group's first terms at WPI. The remaining third will be a special section of Math 1010, differential calculus, taught by Dean of Academic Advising John van Alstyne and a Peruvian graduate assistant. Civil Engineering professor Allen Benjamin, who has worked in South America and speaks fluent Spanish, will be helping advise the students.

But now it's late January and the Venezuelans have just arrived. The immediate problems fell to Student Affiars dean Bernard Brown, who is foreign student advisor. Hard at work over the week's end, he got them settled into their fraternity house rooms, took them shopping for coats, boots, gloves, and other necessities, and generally had the job of getting them oriented to the college and the community.

After their arrival, a number of the Venezuelans wanted to send messages home, so Dean Brown made arrangements for the sending of telegrams. A half-dozen or so wanted to telephone, and when they did an interesting fact emerged: a three-minute phone call to Venezuela can be cheaper than a telegram. Within half an hour the telephone calls were all finished. *(Editor's note: sometimes I can't get half a dozen telephone connections through to the other side of Worcester in that length of time!)*

Although it is a little early for anthing but first impressions on either side, the Venezuelans seem very determined to learn English and to mix in with the rest of the students body. Because of the suddenness of the program, they are housed where there was space available, which meant the fraternity houses. Twelve, for example, are living at Theta Chi. This has upset a couple of the students, who strongly resist being segregated off into a special corner of the campus. This same feeling emerged when Dean Brown arranged for them to see a Spanish-language film their first weekend here, simply as entertainment. They expressed concern that they were being isolated from American culture; they wanted to be integrated into the campus as soon as possible.

The Venezuelan government calls this undertaking the Programa Gran Mariscal de Ayacucho. It was inaugurated last fall, coinciding with the 150th anniversary of the victory which consolidated the political independence of South America. The aim of the program is to both build and broaden the base of educated people who will provide Venezuela's social and economic leadership in the future. Traditionally in Venezuela, the elementary and secondary education available in rural areas has lagged behind that of the urban centers. Therefore, 60 percent of the scholarship funds are earmarked for students who live outside Caracas, the capital city. The students have their tuition, room, and board paid by the government, as well as a monthly stipend. It is expected that the students at WPI will spend five years, including summers, to achieve English fluency and receive their bachelor's degrees.

At present, there are some 1,400 Venezuelan students in the United States under the Programa Gran Mariscal de Ayacucho. About 1,000 entered last summer, and the remainder in January.

What purpose the *Journal?*

Editor: I am pleased to see WPI publications win critical acclaim. The recent editions of the JOURNAL which are devoted to energy (and past articles written in a similar vein) are of a high caliber and scholarly quality. They are sure to maintain our high esteem in the realm of college journalism.

However, I suspect that most alumni would prefer a campus news magazine to a technical journal. Perhaps an article (authored by a member of the Tech community) about WPI's energy-related programs might be more appropriate. Perhaps even an analysis as to how the energy crisis is affecting the thrust of the environmental project work.

More pointedly, is the main purpose of the JOURNAL to elicit greater alumni-student-faculty interaction? Or is the JOURNAL to serve primarily as an organ of continuing education? Tech alumni can turn to any of a number of publications to keep abreast of the energy crisis. But where, other than to the JOURNAL, can they turn for news of the Hill?

John Zorabedian, Jr., '72

Editor: After rereading the latest issue of the WPI JOURNAL, I felt compelled to write you a brief congratulatory note. I firmly believe that the quality of this year's issues has been the highest that I have ever seen in our alumni magazine. The graphics have been superb; the articles much more selective and highly interesting; the campus notes most informative; and the alumni news more complete than ever.

It is most heartening to see that the criticisms which were made by last year's Committee of Concerned Seniors have been taken as constructively as they were intended. Both you and Ruth Trask were most professional about the entire situation, and I would like to take this opportunity to commend the JOURNAL staff.

Leonard J. Brzozowski, '74
Hanover, N.H.

The energy issue

Editor: My compliments on the latest issue of the JOURNAL.

I found the focus on a major topic (nuclear energy) to be extremely interesting and the type of format I would value highly in the future. Thank you for your efforts.

J. Michael Anderson, '64
New York, N.Y.

Editor: I am writing to ask permission to reprint the article by Edward Teller entitled "Don't sleep with two women in your bed" which was published in your August 1974 issue.

We would like to include it in the forthcoming issue of *Skeptic*, which will be devoted entirely to the problem of energy. Each issue of *Skeptic* is, in effect, a debate-in-print about a matter of current public concern (see the issue on crime which I've enclosed).

Christiane Schlumberger
Forum for Contemporary History
Santa Barbara, Calif.

Editor: In response to your October 1974 issue of "Nuclear energy – the promise and the problems," I should like to comment as one whose professional career has been concerned with the power option.

The coverage given by the contributors was meaningful, but your introductory comments were "right on." Twenty-five thousand words, or even twenty-five million words, can't hack all the complexities. On just one facet of the problem, the AEC public hearings on emergency core cooling systems (ECCS) ran well over fifty million words.

One of the most vocal participants at these hearings was Myron Cherry, whose article you have published and whose career is founded upon an extraordinary ability to use words. See how well he gets his points across as he characterizes nuclear fission plants as "unreliable, dangerous and unethical" in the same light as "slick ad campaigns that tell us to brush, wash, cook and make love electrically." The man is absolutely beautiful in his unabashed use of outrageous innuendo, half-truth, sarcasm, slander – even winding up his article with a jail threat for those responsible "for the mess we're in" – as if he himself had nothing to do with the unfair obstructionist tactics which have cost this country millions of dollars in oil imports as nuclear plants he and his ilk opposed had to stand by idly.

In a debate or contest with the highly articulate opponents of nuclear power, the engineers have come off very poorly indeed. There are many reasons for this, including:

(1) A disturbing "consumerist" public attitude which distrusts any leadership in business, labor or politics . . . applauding the critics of any "big business" . . . especially the utilities. It takes dedicated leadership to accomplish a major nuclear project in the face of the regulatory maze and wavering public acceptance.

(2) A great advantage for those on the attack in a complex technical subject such as nuclear power. Who can boil down in defense the fifty million words on ECCS for adequate public understanding, for example? It has been said that a fool can ask in a day more questions than a wise man could answer in a lifetime. To make matters worse, the nuclear oppositionists are no fools! It is easy to create the impression that engineers don't know what they are doing by merely asking more questions than can be readily answered.

(3) To attempt to settle technical issues by public debate is idiotic. The articulate and inflammatory attacks are exciting but destructive. The dull truths about redundant engineered safeguards do not counter the emotionalist's arguments.

(4) Most engineering schools do not emphasize enough the need for basic communications skills. The engineer, to be "responsible," must be responsive to the public's need to know the essential facts in these technical issues. In communicating with the public, many engineers appear to be "talking down" to the audience – a grievous error.

The dull truth is that the nuclear power option is, for New England, just about the only feasible option we have left for the near term (next thirty years) for meeting base load needs with reasonable environmental compatibility and avoiding dependence upon foreign oil imports.

Coal imported to New England will give us fits trying to meet environmental objectives. (The "outrageous" American Electric Power ads debunking SO_2 scrubber technology claims by EPA come closer to the truth than the dreamers at EPA would have us believe.)

Long-term solutions, such as breeder reactors, fusion, or solar power must receive far greater support than received to date. We must cease using up our precious fossil resources, which as any chemical or plastics engineer will tell you deserve a far better fate than flaming away as a boiler fuel.

R. A. Evans, '38
West Hartford, Conn.

WPI from another perspective

Editor: Congratulations are in order once more for WPI's ingenuity. Not only is the article in *Business Week*, "Engineers Learn by Doing" (August 31, 1974), a great achievement and an invaluable asset to the publication of WPI's revolutionary offerings, but the Alumni Association's idea to send reprints to graduates who may not see *Business Week* is extremely astute. I remember hearing and seeing much short-sighted criticism of the Plan with the not-too-sound reasoning that it would create affected education, a gimmick that would ultimately attract only the laziest and most misdirected of students to WPI. The results of the first projects – indeed merely the scope and relevance of these projects – should make obvious the point that the planners had in mind an approach that would realistically educate persons in skilled, applicable engineering. Now a national weekly magazine has seen fit to make this innovation more generally known.

I have been engaged in graduate study at another well known engineering school, Purdue University. Although I did not graduate from WPI as an engineer – I was honestly disillusioned with the profession, not with the school – I think I can view other engineering students with a critical eye. The traditional program of study offered to undergraduates here has very little room for nontechnical academic study. Perhaps the Big Ten consciousness assumes that extracurricular energies spent in varsity athletics should produce the most well-rounded and able engineers; I'm not sure. But it seems it is Purdue's aim to leave any *Active* engineering – that is, project work – for its "more qualified" graduate students. The percentage of BS holders who go directly from this university to jobs, however, is still quite high. Hence the general undergraduate complaint is, understandably, that school is rather meaningless, that what one needs to know about practical engineering will come after one is hired, in on-the-job training.

I am ecstatic that WPI is engaged in something different. There you *are* making school meaningful; there you *are* building a foundation that will help bridge the fathomless "relevancy gap" so common to contemporary education; there you *are* sending engineers rather than trainees to occupational positions.

The Bachelor of Science degree from WPI is a document that truly reflects knowledge gained in an educational experience. If the criticism of the Plan has not turned the heads of the men and women in the Ford Foundation, the National Science Foundation, the Sloan Foundation, or the National Endowment for the Humanities, then it certainly should not turn the heads of prospective students eager to *work* in the field they desire to make their career. The WPI PLAN does not attract lazy students; on the contrary, it is a much more rigorous program of study than the traditional one. When evaluations are perfected, no student will be able to "sneak through" his or her project work without first having taken a wide variety of preparational courses. And of course, these include ones that will develop student sensitivity to the human implications of designing things for "the betterment of humankind," something that we all know has been too much overlooked in the past.

WPI may be forming the basis of a renaissance man of the 1970's. Criticism is understandable, since it springs mainly from those who have been selectively conditioned to respond to the oversimplified patterns set by narrow, sterile, and compartmentalized education. The WPI PLAN will last as long as society needs work done on it, and God knows, that will be many, many years.

Robert A. Manes, '73
West Lafayette, Indiana

Editor's note: *Mr. Manes was the author of "Seven weeks at the jail," which appeared in the February 1973 issue of the* JOURNAL.

Q: What does a liverwurst have in common with a blood vessel?

A: More than you might think, especially to an enterprising student and an imaginative hospital.

THE DELIVERY MEN thought the request was crazy, and the St. Vincent Hospital Research Foundation asked plenty of questions about the bill. But in the end the WPI students at the hospital received their thirty liverwurst sausages and St. Vincent paid for every one of them. *Thirty liverwursts? Thirty?!*

"We had to have those sausages," says Bill Penney, '73, who looks perfectly healthy and hardly in need of such a bizarre diet supplement. "They were a necessary part of our research."

These days St. Vincent Hospital and the National Science Foundation are supporting a wide range of research and development being conducted under the Internship Center program established just three years ago between St. Vincent Hospital (SVH) and WPI. So far, some 70 students, freshmen to graduate, from all areas of engineering and science, have been involved.

St. Vincent is a 600-bed community hospital committed to medical education. Its postgraduate educational programs involve 81 residents taught by approximately 40 full-time hospital staff physicians, and it maintains an active affiliation with the University of Massachusetts Medical School.

Four years ago, the hospital established a department of biomedical engineering, which now employs two full-time engineers and three technicians. Six additional biomedical engineers are employed in other hospital departments and laboratories (cardiac catheterization laboratory, noninvasive cardiology, clinical pharmacology, respiratory diseases, and vascular research). Clinical and basic research is conducted in several hospital departments and in specialized laboratories, including an animal research facility.

"With such a wide range of facilities, the students can carry on a number of projects," says Albert Shahnarian, '69, a graduate teaching assistant and assistant WPI director of the Internship Center. Those interested in finding out about project possibilities at SVH are invited to attend on-going student project group meetings or exploratory meetings if there is interest in developing a new project area. Each project team is fully supervised. Undergraduates are not paid for their project work, but pay tuition for the experience as they would pay for any other part of their education —this requirement applies for all undergraduate project work on and off campus.

Dr. Walter G. Driscoll, director of facilities development and biomedical engineering at St. Vincent and SVH director of the Internship Center, makes one point clear, however. He says, "When we signed the internship agreement with WPI, we were not looking for extra hands. The students are not working in daily patient care but are assisting us with medical research and development. At all times the student projects are performed under the direct supervision of a physician and faculty advisors."

At WPI, a student normally takes three activities (courses and project work) in each seven-week term. Project objectives are defined for this period of time. This helps students to limit the scope of their project activity to attainable goals and gives them a sense of accomplishment at the end of the seven-week term. Most projects extend for periods of 21 or 28 weeks, with students spending the first seven-week term preparing a project proposal and the final two or three terms finishing the work and writing a report.

"It is essential that we match a student with his or her interests and particular abilities to those of a given hospital project," says John R. Boyd, '70, a biomedical engineer and assistant SVH director of the Internship Center. Once a proper match is achieved, the student team prepares a project proposal detailing the objectives of the investigation, the methods, materials and equipment necessary, a critical path analysis and a statement of the final anticipated result. This proposal is then jointly approved, based upon its educational merits and its value to the hospital departments. During the past three years the development of common research goals among WPI faculty, students, and SVH physicians has become evident.

"Our association with SVH has given our biomedical engineering students the proper clinical environment in which to work," explains Prof. Robert A. Peura, '64, who serves as director of the center. "Law clerks and medical interns have traditionally benefited from practical training under the supervision of a senior member of the profession prior to assuming full job responsibility. Now, at St. Vincent, biomedical engineering students have that same opportunity.

"The greatest benefit has undoubtedly been the educational stimulus to the students," says Dr. Peura. By involving students in the solution of real medical problems, the program motivates students to master an area of engineering or science because they have an immediate, specific use for it, and they experience the satisfaction of using this knowledge to help solve a problem relevant to human needs.

"There is an added incentive for those of us from WPI to make this project work, because it is a perfect example of a project relating technology to the needs of society."

Bill Penney (who requested the sausages) was so stimulated by his undergraduate research that he is now a graduate student in biomedical engineering. He has been working with Dr. H. Brownell Wheeler, chief of surgery at St. Vincent, in the development of a device measuring electrical impedance to detect blood clots in major veins. "It is the type of device that could have been used in the diagnosis of Richard Nixon's recent illness," reports Penney. "The potential looks promising. So far the device has had over 95 percent success in detecting serious blood clots."

In order to obtain experimental data on the relationship between change in fluid volume and in impedance variation, he designed experiments which used a sausage as a close approximation to the human leg, in both dimensions and electrical impedance.

"It was at Dr. Wheeler's suggestion that I decided to use sausages," Penney says, "but I didn't know what kind. I couldn't ask my parents' advice, because they're vegetarians. My grandmother isn't, though, and she told me to use liverwurst."

After getting the liverwursts, Penney bored holes in them to simulate blood vessels. The holey sausages were then filled with saline solutions ("we tried using blood; it worked but it was terrible!") while changes in impedance were monitored. Results correlated quite well with Penney's theoretical analyses.

After being initially exposed to vascular research as a senior in electrical engineering, Penney started a basic investigation into the source of the signal measured by the impedance plethysmograph (a device which measures changes in volume). He concluded after researching the literature that many clinical researchers had accepted early work in the field without critical review.

He decided to establish an electrical field model of the human calf, developing competence in electrical field theory by working with WPI physics professor Lorenzo Narducci. Later he developed sophisticated and effective experimental techniques in order to validate his model.

Weekly group meetings impressed upon him the need for well-written project proposals and progress reports. He formulated a critical approach through responsible questioning of project proposals presented at the weekly meetings. Because his theoretical predictions and experimental results agreed reasonable well, he proved to himself that he could successfully apply engineering techniques to the solution of clinical problems.

His interest in his work was aroused and he decided to continue as a biomedical engineering graduate student. Penney's work has been accepted for presentation and publication at a biomedical engineering meeting and he is co-author of an article currently in the medical literature.

It appears that his work at the Internship Center has not only been educationally worthwhile, but has also resulted in tangible scientific accomplishments which have motivated him to pursue further graduate study and will broaden his career opportunities. In addition to furthering his technical knowledge, Penney has developed leadership skills and assumed the role of project manager. He initiated a National Science Foundation (NSF) Student Originated Studies Grant and successfully directed nine students last summer in the vascular research laboratory. The NSF study, involving students from Holy Cross, Clark, and WPI, investigated the feasibility of detecting disorders of arterial flow in the leg by means of impedance plethysmography.

"It was at Dr. Wheeler's suggestion that I decided to use sausages, but I didn't know what kind. I couldn't ask my parents, because they're vegetarians. My grandmother, though, told me to use liverwurst."

Graduate student Frederick A. Anderson, Jr., has been involved in a related project, the calibration of the volume/impedance apparatus for measurements of blood flow in veins. Simultaneous volume measurements employing mechanical and electrical devices were performed on the calves of nine subjects. Analysis showed a linear relationship between venous blood volume and electrical impedance.

Other students are finding the internship program rewarding. For example, Albert E. Barrett and Robert A. Duris, both seniors last year developed a telemetry system for remote monitoring of the human respiratory rate. They created and refined a prototype system in which a pair of eyeglasses worn by the patient broadcasts his respiratory signals to an FM radio.

This project was based on the principle that the difference in temperature between the inhaled and exhaled air of a person is sufficient to cause a significant resistance change in a small thermistor. According to Barrett, the device was designed to measure the number of breaths per minute of a respiratory patient who is ambulatory. "If the patient should suddenly stop breathing, an alarm would immediatley be sent out to the nurse on duty at a central monitoring board," he explains. By utilizing such a respiratory monitoring system, an ambulatory

patient would have much more freedom to move about. He wouldn't have to be confined to his bed by wires. The eyeglass monitor may also be used as a testing aid for the hospital's respiratory laboratory.

Barrett, who has been working for six months, writes: "The experience I gained working on the respiratory monitoring project has helped me out in my job as an engineer at Pratt and Whitney Aircraft more than any single course I took."

Dr. Howard Schwartz, director of emergency medicine at SVH, WPI's Dr. Romeo Moruzzi, Dr. Peura, and Mr. Shahnarian are supervising a group of eight students who are currently looking at the whole question of the emergency medical system for all of Worcester County. "This involves real teamwork on the part of everyone involved," says Peura: "the students, physicians, advisors, and the patients themselves. Also," he adds, "there is an added incentive for those of us from WPI to make this particular project work, because it is a perfect example of a project which relates technology to the needs of society."

They created and refined a system in which a pair of eyeglasses worn by a patient broadcasts his respiratory signals to an FM radio.

Presently several students are working with the department of emergency medicine to investigate specific aspects of the emergency medicine outpatient system in order to build a data base to model the complex interactions of the system. Part of this group is analyzing the operations of the emergency room through the eyes of the patient. A second group is preparing a procedure for collecting accident data with respect to location, ambulance, time, type of emergency, and so forth. The legal and ethical aspects of emergency care are being studied by a third group. The fourth group is looking at the socioeconomic level of patients using the SVH emergency department.

In most cases the information that the students are seeking is largely nonexistent, yet it is necessary in order to begin to understand the complexities of the system. As the current student groups complete their project objectives, it is expected that new students will continue to develop the emergency medical system model for the county.

"Actually," Dr. Peura reports, "the emergency medical system project grew out of an earlier project working with Dr. Steven Ayres, chief of medicine, concerning the implementation of a community coronary ambulance system. This shows how student interest grows and new ideas for viable projects are born."

Some other recent WPI-SVH projects are biotelemetry, using a hospital carrier-current system, design of an arterial-venous shunt, and the programmed move of clinical laboratories into the new Rose Building so as to cause minimum disruption of service.

Current projects include hospital training through videotape, membrane properties of irreversible and reversible sickle cells in sickle-cell anemia, and photomicroscopy.

"As you can see," Dr. Peura points out, "a wide range of projects is available. But nothing remains stable. New ideas come along all the time." For example, a vascular research data base is being developed by William D. Cunningham, '77, because there was a need to analyze statistically the patient data record at St. Vincent's vascular research laboratories. The object of this project is to develop a data base and Fortran programs so that the information processing and handling will be more efficient.

Two graduate students have promising projects underway. Bruce Haffty is investigating the possibility of developing a noninvasive technique for the early detection of pulmonary edema. Charles Pritchard, '73, is working on the development of automated computer analysis of electrocardiograms.

Margaret St. John, '75, has been using two electron microscopes for her project, the observation of colon cells. She prepared colon biopsies for WPI's scanning electron microscope, observed and photographed them, and then sectioned them for a look via SVH's transmission microscope. Dr. Jerome Jacobs of the Pathology Department says, "This allows observation of the same cell structure by two methods, one in which the cell surface is observed, and the second where the internal fine structure can be seen."

Robert L. Fried, '75, a physics student, is studying the effects of silicone implants in rats who are exposed to x-rays. This has significant medical application in the management of breast cancer because x-ray therapy is complicated in patients who have existing silicone breast prostheses. Chronic irradiation of these patients imposes risks. Fried is working with two groups of rats, a control plus a second group with silicone implants, which are irradiated five days a week with a controlled dose of x-rays. The rats' temperatures are recorded daily to detect any induced fever.

At right, Bob Fried prepares to anesthetize one of his experimental silicone-implanted rats prior to irradiation.

The test the students helped devise is now a standard clinical lab procedure available to any patient at St. Vincent Hospital.

Oliver J. Smith, '75, recently assisted with the development of a respiratory sound recording system he calls the listening post. A portable electronic system was designed and built to provide a dual-channel signal for magnetic tape recording, with playback at a later time for clinical use.

DURING THE PAST THREE YEARS, the time and facilities invested in the internship program have produced a good return to SVH in terms of useful and practical work; the technical base of the hospital has been broadened significantly. For example, the students in the vascular research laboratory were greatly motivated by the opportunity to work on a problem clearly related to patient needs. They validated concepts behind the measurement of venous outflow obstruction in order to detect the presence of clots. The test they helped devise has now been adopted by the hospital as a standard fee-for-service clinical laboratory procedure available to any patient at St. Vincent Hospital. SVH has also benefited in other ways. Major equipment at WPI has become available for medical use, such as the scanning electron microscope and the computer facilities.

"The research projects have been of value to the WPI faculty advisors, too," relates Shahnarian. "The advisors, through the projects, have been exposed to new applications of engineering and science in medical fields." An exchange of ideas occurs repeatedly between the engineering and medical professions in the joint projects. There have been occasions when the advisors had to study as hard and learn as much as the students.

In general, the directors and advisors feel that the students have benefited most of all from the WPI-SVH Internship Center. The program has broadened them educationally by giving them the experience of relating their technical knowledge to actual problems of clinical medicine. They have, for the most part, accepted the challenge willingly and responded with ingenuity and enthusiasm.

Observers of the program believe that it helps students develop foresightedness, sophistication, self-confidence, analytical competence, creative imagination, perseverance, and managerial skills. These attitudes and skills are difficult, if not impossible, to impart in the context of a traditional classroom course.

Projects have helped students to direct their orientation toward further education at both the undergraduate and graduate levels. Many students without any apparent career direction have formalized specific plans for additional education in biomedical engineering or employment in the health-care field.

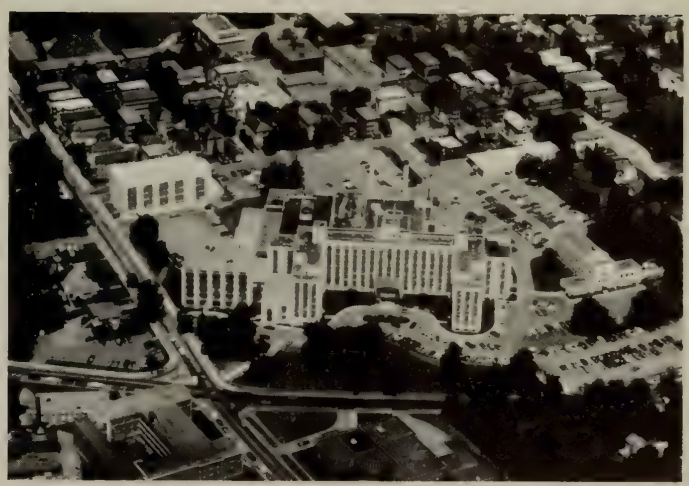
The WPI-SVH Internship Center has also proved useful for students entering other disciplines. It gives students an opportunity to apply themselves in a complex environment where the challenges are more than technical in nature. They learn to work with and through others, to accomplish specific objectives – a prime prerequisite for success in any discipline, any vocation.

Bill Penney, one of the first students to undertake research at the center, feels that for him learning to communicate was the most rewarding aspect of the program. "There is a constant interplay of technical and medical ways of thinking at the center," he relates. "Everybody is working toward the same goal from a different viewpoint on each project. It's really interesting." WPI

Immediately below is a view of St. Vincent Hospital.

At left below, Paul Schrader sets up instrumentation for a vascular experiment.

At left, Bill Penney uses his blood volume device on a live subject instead of a sausage.



"There was a young lady from Becker..."

ONE OCTOBER AFTERNOON the Goat's Head Pub resembled, at least a little, a poetry festival. The occasion was a limerick contest, with free beer offered as an inducement for students and faculty to participate.

Well, you know how it is with limericks. We both know that I can't possibly print in this magazine the best ones. There does seem to be something inherent in the tradition of limerick writing that ensures that at least 50 percent of all limericks are dirty. And there were several real gems produced in the pub that day which will go unpublished here.

The selection of "verse" that follows omits several prize winners: the "sickest," the "most pessimistic," and an honorable mention for "worst spelled" – one which also didn't seem to make any sense. Because of the free beer offer, a surprising number of limerick writers copped out by ending on one variation or another of "So now let's have my free beer." These were deemed unworthy of perpetuation.

There once was a coed of Worcester
Who dreamt that a Techie sedorcester.
She awoke with a scream,
But 'twas only a dream;
A bump in the mattress had gorcester.

We all know a guy named van-A
Who invented a special new way
The grades are all missin'
With open admission:
If you flunk out you still have to pay.

("funniest")

There once was a school with a Plan
For building the Renaissance Man.
But the Plan didn't work,
So the school built a jerk,
Then took his tuition and ran.

("most optimistic")

There once was a thing called the Plan
Which required a certain elan
But the students and staff
Didn't have it by half
And what is left is incredibly bland.

There was a Recondo named Knute
Who loved above all things to shoot.
When closing in for the kill
Of a frosh on the hill,
Knute misfired and blew up the Tute.

In an effort to be innovative
Tech tries to make us creative.
They first gave us Broc
And to finish their schlock
Use limericks to be humilitative.

A number of students took on faculty members in their versification:

Wilbur Bridgman's been here for a while.
At teaching chemistry he has style;
With his eyes on the floor
And mine on the door
He should be an expert on tile.

There is a professor named Lance
Which conveniently rhymes well with "pants"
But since he's the judge
I'll just say "Oh fudge!"
But after more beer I might take the chance.

There is a professor named Ollie
Who walks around campus quite slowly.
But whenever he's here
He'll be drinking a beer
And smoking cigars that smell moldy.

and finally:

A lazy young Techie named Funt
Most always decided to punt.
While writing this rhyme
He ran out of time

But let's not let it end there. How about some alumni contributions: for each limerick published, the JOURNAL will award one (1) free beer at the pub on the occasion of your next visit to campus. Entries should be related to WPI, and though I promise to enjoy all funny dirty limericks I probably won't print them. Criteria, obviously, are good taste and good humor, the deadline for entries is April 15. You may use the enclosed card for this if you wish.

– R.K.

Dick Whitcomb: NASA's aerodynamic genius does it again.

LAST DECEMBER 13TH was Friday the 13th for everybody else, but for Dr. Richard T. Whitcomb, '43, it was just another lucky day. Another day, another award.

On that particular date, Dr. Whitcomb was presented with the Wright Brothers Memorial Trophy for 1974 at a special ceremony held in Washington, D.C. The citation was given by the National Aeronautic Association in recognition of his significant contributions in advancing the science of aeronautics in this country and abroad. Earlier, in June, he had received a $25,000 cash award from the National Aeronautics and Space Administration, the largest single cash award ever given to a NASA employee.

In October of 1973 President Nixon presented him with the National Medal of Science, the nation's highest honorary scientific award.

"The National Medal has to be the honor that pleases me most," Dr. Whitcomb reports. "Of course I am very happy about the Wright Brothers Trophy, but the National Medal has a special meaning for me."

Dr. Whitcomb also won the prestigious Collier Trophy for the "greatest achievement in aviation in America" in 1954; the Exceptional Service Medal of the Air Force in 1955; the first Distinguished Service Medal to be presented by the National Advisory Committee for Aeronautics (NASA's predecessor) in 1956; the U.S. Junior Chamber of Commerce Award designating him as one of the ten outstanding young men in America, also in 1956; the NASA Scientific Achievement Medal and the Sylvanus Albert Reed Award from the American Institute of Aeronautics and Astronautics (AIAA) in 1969. He was elected a Fellow of AIAA in 1971. At 35, he was one of the youngest people ever to receive an honorary doctor of engineering degree from WPI.

It was considerably more than luck that brought this parade of awards to Dr. Whitcomb's doorstep. An internationally known aerodynamicist, his research contributing to the advancement of flight in the United States was what earned him the honors.

After graduating "with high distinction" from WPI in 1943 and receiving the degree of bachelor of science in mechanical (aeronautical) engineering, he joined the staff of Langley Research Center in Hampton, Va. In 1956 he was appointed head of the 8-Foot Tunnels Branch of Langley's High Speed Aircraft Division. He undertook the responsibility of supervising the development of means for improving aerodynamic performance of aircraft at transonic speeds and the practical application of these improvements to specific aircraft.

In 1952 he discovered and later experimentally verified a revolutionary aircraft design concept called the area rule. This is a method of designing aircraft to reduce drag and increase speed without the addition of power. The resulting "coke bottle" shape fuselage is now incorporated into every American supersonic airplane.

Dr. Whitcomb also invented the NASA's supercritical wing, conceived at Langley as a result of wind tunnel studies conducted during the late 1960's. The wing has been tested in flight at NASA's Flight Research Center, Edwards, Calif., on a modified F-8 jet fighter aircraft. If successfully applied to future aircraft, particularly to commercial jet transports, the wing offers the promise of improved performance and efficiency in cruise flight close to the speed of sound. NASA anticipates that subsonic performance gains will be possible through use of the wing on supersonic military aircraft.

Both the experts and the commercial airlines agree about the potential of the Whitcomb wing. It has been estimated that through the use of the wing, the improved performance could save the airline industry $300 million a year in fuel bills alone. However, the airlines aren't rushing out to have planes built equipped with the new wing. Not because it has any known defects. It's been thoroughly tested. But the industry has been hurt by spiraling fuel prices and oil shortages. In order to save that $300 million in fuel annually, the airlines would have to shell out many more millions for planes with the supercritical wing. The experts say that it will probably take at least five

years and the loss of over $1 billion in fuel that could have been saved, before planes with the Whitcomb wing will be in use. "If fuel prices skyrocket again or if there's another Arab oil embargo, the airlines might consider equipping their old planes with the new wing," says Dr. Whitcomb.

The Whitcomb-designed wing helped to solve a problem that had troubled aeronautical engineers for years. When subsonic planes reached their maximum speed of over 600 miles per hour, they experienced drag and buffeting and a loss of stability. Air moving over the wing's upper surface reached supersonic speeds while the plane was traveling at a slower rate. To minimize these problems, the planes were flown at slower speeds which decreased their performance and efficiency.

Dr. Whitcomb admits that he is no mathematical genius and reports that he relied mainly on his intuition in searching for an answer. He experimented with a wing that had a flatter upper surface. Wind tunnel tests indicated that the redesigned wing slowed down airflow. As a result, there was less drag and buffeting. It would ultimately mean more aircraft stability at transonic speeds.

Currently Dr. Whitcomb serves as head of the Transonic Aerodynamics Branch in Langley's High-Speed Aircraft Division. And it looks as though he intends to stay there, in spite of tantalizing offers from the aircraft industry.

"We researchers have what we like at Langley," he says. "Independence. In private industry you can't think ahead and you have to worry about contracts."

It was this kind of dedication that enabled Dr. Whitcomb to become one of the top aerodynamicists in the world. It was also one of the reasons why he was the recipient of his latest award, the coveted Wright Brothers Memorial Trophy, given for "significant public service of enduring value to aviation in the United States."

The trophy, a miniature silver replica of the original Wright brothers' airplane, was presented to Dr. Whitcomb at the Wright Brothers Memorial Dinner in Washington last December. On one of his many lucky days. Friday, the 13th.

WPI

Dave Emery goes to Congress, maybe . . .

The original title of this article was "Dave Emery goes to Congress: You can get there from here." And when we wrote it in early December, that did appear to be the case. At press time, however, with about 12,000 contested votes involved in a suit by Emery's opponent, no one knows who will be finally seated in the House, and there is some possibility that the issue won't be settled until June.

So as not to lose time, Emery has moved to Washington and begun putting together his staff. His opponent, of course, is already ensconced there. But regardless of the final outcome of the election, we think you'll find Dave Emery's story interesting, so we're printing it the way we originally wrote it, with only this introductory disclaimer.

YOU WOULD EXPECT that WPI's first alumnus to be elected to the U.S. Congress would most likely be a liberal Democrat with plenty of financial backing. It would almost go without saying that he was middle-aged and professionally prominent in business, legal, or industrial circles. Almost.

David F. Emery, '70, of Rockland, elected last November from Maine's First Congressional District, should be all of those things. In fact, he is none of them. He is a conservative, 26-year-old Republican who turned a shoestring campaign against a four-term Democratic incumbent into a ticket to Capitol Hill. And as for his being professionally prominent . . . "My only jobs since graduating from WPI have been part-time ambulance driving and doing electronics work for a friend," he reports.

David Emery hasn't had time to pursue another career. While still an undergraduate electrical engineering student at WPI, he entered the primaries to represent Rockland in the state legislature and defeated a 22-year incumbent by a vote of nearly 2 to 1. He had no Democratic opponent in that 1970 election, but he went on to win the seat again in 1972.

Besides representing his constituents, Emery decided to actively seek Maine's First District Congressional seat last year. Financially, his campaign was a trial from the start. He came to be known as the most poverty-stricken candidate running for any major Maine office.

Emery, a bachelor who lives with his mother, estimates that in 1973 he earned about $7,000 with more than half coming from legislative service and the rest from his part-time jobs. Last year he subsisted almost entirely on his legislative pay.

"I still had $1,000 in the bank last January," he recalls, "but by September there was only about $5 left." Eventually he had to borrow $2,500 to live on and $2,000 more for campaign expenses. His largest contributions were two $500 donations and a $3,000 down payment on the state GOP's pledge.

After looking at the state of his general finances, Emery decided to wage a "Walking to Congress" campaign. Shoe leather, after all, costs less than TV time. "Besides, it was a poor year to ask anyone to invest in a Republican politician," Emery admits wryly. So he walked some 600 miles around his district, rang 200 doorbells a day, and shook over 16,000 hands. "The shoe-leather technique wasn't a gimmick, either," he says. "Walking is the only way you can get to know the people."

One of the most amazing facts that he learned from his campaign was that most of the people who shook his hand had never met a politician before in their lives. Evidently the people liked what they saw in politician Dave Emery. In half an hour as he trekked down one Main Street, four strangers volunteered to work on his campaign. Everywhere along the route he and his small staff were offered refreshments.

Emery took his people-to-people campaign right to the voters' doorsteps. Nearly every day he rang 200 doorbells. If anyone answered, he'd say, "Hi! I'm Dave Emery, running for Congress against Peter Kyros. Just wanted to come by and say hello." If nobody was at home, he'd scribble a "Sorry I missed you" note and leave it inside the screen door. "When they got back home at night, they all knew I'd been to see them . . . in person," he recalls. On November 5, the shoestring walking campaign paid off as he managed to squeak by his four-term Democratic opponent by a few hundred votes.

Emery feels his political drive came from his grandmother. Sarah Philbrick of Rockland, now in her 90's, often discussed political affairs with her grandson when he was scarcely more than a toddler. Although she was never active in politics herself, her interest in the subject was passed along to willing ears.

Back in 1956, when he was only eight years old, Emery's budding political interest in Eisenhower stirred him to stay up past his bedtime with a radio tucked beneath his blanket so he could find out how his hero was faring in the election returns. At 13 he knocked on doors in Rockland as a Teen-Age Republican (TAR.) Later he became TAR's First Congressional District chairman. While at WPI, he was adviser to Worcester County Young Republicans. He also served as a campaign worker for Massachusetts' former governor John Volpe and Senator Edward Brooke.

What really channeled him into a political career was his stint as a page at the GOP national convention in Miami Beach in the summer of 1968. "That was right after my sophomore year at WPI," he remembers. "I'll never forget that summer as long as I live. The convention was the most exciting thing that ever happened to me."

As he watched the senators and congressmen walk through his hotel lobby, he decided then and there to run for office during the next election. The opportunity cam up in 1970, when he was a senior at WPI. By spending his weekends in Maine politicking, and directing his campaign from WPI weekdays, he scored his first big upset, winning the representative seat from Rockalnd by a margin of 2 to 1. He hasn't lost an election since.

How do the hometown folks feel about their brand new congressman? In a word, proud. "Even as a teenager, Dave stood out as a young man going places," says a former school teacher. Sincere, exceptionally mature, and high principled are other descriptions.

"As a youngster he was already interested in people and business," reports his mother, Mrs. Albert O. Emery, a registered nurse. "When he was only five he operated a small parking lot for summer visitors right next to our house. By the time he reached junior high school, he was earning $200 a summer from the lot. It helped him to develop business sense. He also learned how to meet people."

In January, Congressman David Emery took his Yankee-honed business sense, his ability to meet people, and his hiking shoes to Capitol Hill. Only time will tell how far they take him. WPI

The data on which these class notes are based had all been received by the Alumni Association before December 15, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI JOURNAL.

1903

Henry J. Potter writes that his new home address is 26 Sheffield Road, West Yarmouth, Mass.

1908

Herb Carleton's wife, Myrtis, died on July 28, 1974, following an illness of several months. Class Secretary **Donald D. Simonds** writes: "They were a great couple and were fortunate in a companionship of nearly 65 years."

1910

The **George F. (Hap) Martins** have moved to 152 Sherbert Rd., Ashburnham, Mass. 01430. Hap is recuperating at Heywood Memorial Hospital in Gardner, Mass., following extensive surgery.

1919

George R. Rich received honorary membership in the American Society of Civil Engineers at the annual National Environmental Engineering Convention held in Kansas City, Mo. last October. He is a senior vice president and director of Chas. T. Main, Inc. During his career he has supervised numerous hydroelectric and water-control projects including the Cape Cod Ship Canal and the TVA.

1921

Mr. and Mrs. **Fred Weitzen** of San Diego, Calif., recently celebrated their 50th wedding anniversary. Mr. Weitzen retired as chief court reporter of the Municipal Court in 1962.

1923

Recently **J. Carleton "Pop" Adams** and his son, Jack, '50, were spotlighted in the Connecticut General Life Insurance Co. magazine, *View*. In the story Pop tells how he rechanneled his career from civil engineering to insurance.

"I'd been doing bridge design work in the Pittsburgh area for about 10 years when the depression hit," he says. "Engineering looked pretty slim in those days so I decided to switch fields."

Insurance sounded like a natural to him. He already had a couple of Connecticut General policies, so he went to the C.G. office in Pittsburgh to investigate the possibility of selling.

"The time was right," Pop explains. "I was the first person hired when the estate planning philosophy was beginning to take shape."

Pop says switching from engineering to insurance isn't as great a change as one might think, for problem-solving exists in both fields.

"Whether you work with concrete and steel or with money management, it doesn't make much difference," he claims. "Either way you are building a structure to solve problems."

After learning to sell using the estate planning philosophy, Pop joined the C.G. staff and did tax consulting together with research and program design work with the agents. His contributions to the Field Technical Committee helped form a bridge from package selling to estate planning.

Pop's interest in WPI and success in the insurance field made a strong impression on his son **John R. "Jack" Adams, '50,** who followed him to WPI and later into a career with Connecticut General. According to his father, Jack says his two years at WPI have put him way ahead of others in knowing how to attack and solve problems.

Currently Jack is an assistant manager and personal producer in Indianapolis. Previously he held staff positions in Hartford and Kansas City.

1924

Warren B. Fish has been appointed to the Connecticut State Historical Commission by Governor Thomas J. Meskill. The post includes automatic membership on the American Revolution Bicentennial Commission which will coordinate celebration activities for the nation's 200th birthday in 1976. . . . **Frank Linsley** of Thomaston, Conn., was elected pre-eminent governor at the annual meeting of York Rite College (17). He began his Masonic career in St. Andrew's Lodge (64) in Winsted, Conn., in 1936 and since then he has been awarded a number of medals in recognition of his distinguished service to Masonry. He was employed by utility companies in Massachusetts, New York and Connecticut. He retired as transmission and distribution engineer for the Hartford Electric Light Company.

1927

Bradford M. Bowker is a special building inspector for the Clark County Building Department in Las Vegas, Nevada. . . . Last August **Charles MacLennan** retired from the staff of Harza Engineering Co., Chicago, where he had held the post of utilities engineer. Following a vacation in England, Spain and Canada, he joined the Canadian Executive Service Overseas' Organization in October for an assignment in Brazil. He is based in Florianopolis where he is serving in an advisory capacity in connection with electrical development in the state of Santa Catarina.

1929

Brian J. O'Connell, son of **Andrew J. O'Connell,** has passed the Massachusetts Bar exam. He was one of 989 state residents who passed the test out of 1,290 applicants. Andy has retired from the Worcester Academy faculty and lives in Worcester.

1931

George W. Smith, who was with Factory Insurance Association, Philadelphia, for many years, has retired. Presently he is located in Tuckerton, N.J.

1932

Timothy D. Crimmins retired as chief plant engineer last March from CF & I Steel Corp., Roebling, N.J.

1936

C. Norman Svenson continues with G.E., but is now located in Wilmington, Delaware.

1938

Richard M. Stuart is currently with G.E.'s Telecommunication Products Department in Lynchburg, Va.

1939

Walter L. Longnecker holds the post of vice president-international at Gould, Inc., in Chicago. . . . **Ernest L. Sykes** writes that not only is he serving a year with VISTA, his wife is serving also. A registered nurse, she is working in a clinic in Española, N.M., one of several operated for agricultural workers in the underdeveloped and depressed northern area of the state. Ernie works with non-profit Development and Support Corp. in Española, which is set up to assist small rural communities to obtain new or upgrade old domestic water systems. This includes applications for grant money and loan money, engineering feasibility studies, final engineering and construction drawings, and construction inspection. If the community association wishes, the corporation can also furnish them operating and maintenance service as well as billing and accounting services. As VISTA volunteers, the Sykses are paid just enough to cover food, lodging, and

personal expenses so that they can live at the subsistence level of the people with whom they are associated. They are considering extending their service period with VISTA, finding the work adventuresome and challenging.

1941

Paul G. Bonin currently serves as manager-technical service international at Union Carbide Corp., Wayne, N.J. . . . **Charles L. Hoebel** is the Washington, D.C., representative for Carrier Corporation. . . . **Arthur J. Jackson** is with Peabody Engineering Corp., Stamford, Conn.

1942

Charles D. Berry works as a senior sales engineer at Addelco Corp., Needham, Mass. . . . **Joseph N. Christian** is a sales engineer at Priority Systems, Inc., Covina, Calif. . . . **James F. Robjent,** purchasing manager of Scott Paper Company's Northeast operations, has been awarded the title of certified purchasing agent by the National Association of Purchasing Agents. The award is based on academic achievement, experience in the purchasing field, contributions to the professional aspects of purchasing and completion of several written examinations. He has been purchasing manager since 1954. Previously he worked in H & W's Boston office.

1946

Edward A. Pendleton owns and operates Pendleton Fire Brick Co., Bloomfield, Conn. . . . **J. Larry Stewart** is the owner of Stewart Technical Sales in New York City. . . . **Malcolm K. White** holds the post of pollution control director at Pervel Industries, Inc., Plainfield, Conn.

1947

Paul D. O'Donnell is general manager in the Tampa (Fla.) Division of Westinghouse Electric Corp.

1948

Charles F. Jones serves as president of Nuclear Utility Service Corp., Rockville, Md. . . . **William G. Ritchie,** vice president of STV, Inc. (consulting engineers), in the Washington, D.C. office, has been appointed federal government marketing manager. Formerly he was president of another STV firm, Environment & Technology Assessments, Inc. He will remain in Washington in his new assignment as marketing consultant on federal projects nationwide. He joined Sanders & Thomas in 1962 and was elected a vice president of STV in 1972.

1949

Francis J. Bigda presently serves as sales manager at Semicon, Inc., in Burlington, Mass.

1950

Prof. **Richard Beschle** of the life sciences department at WPI was recently awarded the Silver Beaver award for outstanding service as a volunteer leader in the Boy Scouts. He is the camping and activities chairman of the Mohegan Council, cub master of Pack 102, committeeman of Troop 19, and the former cub master of Pack 27 in Auburn. He also has served as district chairman for the southwest council district, a member of the council executive board and chairman of camping and activities at the Treasure Valley Scout Reservation in Paxton, Mass. . . . Colonel **Frank W. Harding** is a member of the massive U.S. Air Force team that assisted in the development of the new B-1 strategic bomber. He is director of procurement at Wright-Patterson AFB, Ohio, with the B-1 systems program office which coordinated the work of more than 60 civilian contractors who helped design, develop and test the aircraft's systems. The B-1 will be the successor to the Strategic Air Command's B-52 Stratofortress.

1951

Maurice Gosselin serves as materials flow manager at Dow Corning Corp., Midland, Michigan. . . . **Walter J. Kolodne** is a builder-developer with Multiplex Corp. of Virginia in Alexandria. . . . **Duncan W. Munro,** superintendent of Mount Auburn Cemetery, Cambridge, Mass., was recently elected second vice president of the American Cemetery Association at the national trade group's convention in Las Vegas, Nevada. The post includes membership on the executive committee. Munro has served as a director of ACA and written numerous articles for the association's journal.

1953

Richard A. Davis has been promoted to vice president and general manager of the Thermos Division (King-Seeley) operations within the United States. He joined the firm in 1973 as director of manufacturing. From 1953 until 1973 he was associated with the General Electric Co. He was manager of manufacturing at the G.E. Portland, Me. generation products facility prior to accepting a position with Thermos. . . . Dr. **Robert W. Fitzgerald** of WPI's civil engineering department is one of four speakers sponsored by the National Fire Protection Association who have been traveling around the country lecturing on the safety features that are needed in high-rise buildings.

1954

Joseph J. Fratino is manager of engineering services at Columbia Gas Transmission Corp., Charleston, West Virginia.

1955

Currently **Harold S. Sauer** holds the position of vice president of Medical Innovations, Inc., Waltham, Mass.

1956

Richard J. Emery works as manufacturing superintendent at E.I. duPont in Old Hickory, Tenn. . . . **George P. Strom** was recently appointed director of materials management at Ortho Diagnostics, Inc., a subsidiary of Johnson & Johnson. He is responsible for distribution services, purchasing, production planning and materials handling. A past president of the Cranford (N.J.) Board of Education, he has also been involved with Little League football, the Boy Scouts, and the United Fund drive.

1957

Robert P. Engvall has been appointed director of facilities and construction at Connecticut Mutual Life in Hartford, Conn. Previously he was superintendent of manufacturing services at Astra Pharmaceutical Products in Worcester. . . . **Paul J. Kerrigan** serves as executive vice president at Gerald Rosen Co., Inc., in Framingham, Mass. . . . **Arthur Nedvin** was recently named director of plans and controls for IBM World Trade Asia Corporation. For the next two years the Nedvins and their three children will be living in Tokyo, Japan. . . . **Edward A. Stucke** is now with G.E.'s Ordnance Department in Pittsfield, Mass.

1958

Robert F. Bernado has retired as a lieutenant colonel from the U.S. Air Force and is currently located in Nashville, Tenn. . . . **William S. Brower, Jr.,** is automation consultant at Control Data Corp., Glastonbury, Conn. . . . **Michael S. Gutman,** formerly with Digital Marketing Associates, has been appointed marketing manager, Component Computers, for the Digital Equipment Corp. in Marlboro, Mass. He will be responsible for all aspects of the marketing and sales support program for microprocessors and other modular computers sold by the Components Group. . . . **Richard M. Wiberg** serves as a senior process engineer at Nekoosa Edwards Paper Co. in Port Edwards, Wisconsin.

1959

Burnham H. Baker holds the post of vice president at Inforex, Inc., Burlington, Mass. . . . **Robert A. Berg** is now a factory manager for Rexnord. . . . **Peter K. Bertsch** serves as manager, food packaging engineering, at Sweetheart Plastics, Wilmington, Mass. . . . Dr. **Norman A. Hiatt** is a senior research engineer at Norton Co., Worcester. . . . **John R. Mack** works for Curtiss-Wright Corp., Wood Ridge, N.J. . . . **Windle B. Priem** recently received an award from the U.S. Small Business Administration for directing the agency's outstanding region for 1974. He is regional director of SBA's Region II which includes New York, New Jersey, Puerto Rico and the Virgin Islands. During the fiscal year ending last June 30th, Region II approved loans totaling $281,310,000 and trained and counselled more than 20,000 people.

1960

Michael J. O'Toole, Jr., is chief, Bureau of Water Quality Planning, for the New York State Department of Environmental Conservation in Albany. . . . **Edward J. Russell** is with Group Executives at General Electric Co. in Bridgeport, Conn.

1961

Born: to Mr. and Mrs. **John A. Quagliaroli,** a son, James John, on October 3, 1974. John is with First National City Bank in Cambridge, Mass.

Harold W. Alatalo has joined General Electric in Binghamton, N.Y. . . . **Henry P. Allessio** is now the director of marketing and planning for Geon Industries, Inc., Woodbury, L.I., N.Y. Geon is on the American Stock Exchange and is the country's largest independent importer and distributor of replacement parts, specializing in foreign cars. Allessio was formerly a principal in the firm of William E. Hill & Co., Inc., New York City, a part of the management consulting division of Dunn & Bradstreet. With his wife, Judi, and daughters, Darlene, 9, and Suzanne, 2, Allessio resides in Pelham Manor, N.Y. . . . Currently **Richard J. Baker** is pastor of the First Presbyterian Church in Avonmore, Pa. . . . The Rev. **Roger R. Borden,** associate professor of mechanical engineering at WPI, has been appointed pastor of the Fitchburg (Mass.) United Methodist Church. He is an ordained deacon of the Methodist Church and is presently completing work for eligibility as an elder. . . . **Richard D. Cohen** is an account executive at Thomson & McKinnon, Auchincloss Kohlmeyer, Inc., in Baltimore, Md. . . . **Nino M. DiPilato** serves as a staff engineer at IBM Corp., Hopewell Jct., New York. The DiPilatos have two children, David, 2½, and Michael, 6 months.

1962

Born: to Mr. and Mrs. **Joel L. Gordon** a daughter, Jennifer, on June 21, 1974. Gordon is a self-employed environmental consultant in San Juan, Puerto Rico. . . . to Mr. and Mrs. **John V. Meregian** a daughter, Nicole, on November 23, 1974. Nicole has an older sister Tanya, 3. Meregian is quality control manager for the Northern Manufacturing Division of Kendall, a subsidiary of Colgate, in Walpole, Mass.

Albert C. Andrews serves as corporate director, production control, at Western Publishing in Racine, Wisconsin. . . . The Rev. **Paul W. Goranson** has been assigned to Grace Episcopal Church, Oxford, Mass., as an assistant to the vicar. Earlier he was with the Peace Corps in Ghana, taught math, physics and chemistry in Massachusetts and North Carolina and did community development work with the U.S. Agency for International Development, in Vietnam. He recently received his master of divinity degree from General Theological Seminary in New York City. He was ordained a deacon last June. . . . **John M. Samborski** is currently administrative assistant to the vice president of colors and chemicals at BASF Wyandotte in Parsippany, N.J. . . . Capt. **John R. Tufano** is now stationed at Rock Island, Ill., at the U.S. Army Armament Command.

1963

Richard L. Alling has been promoted to assistant superintendent of pressed metal products at Torrington (Conn.) Co. Since joining the company in 1964, he has served as an engineer in bearing production, concentrating on thrust bearings. . . . **Carleton "Pete" Borden** now works as an orlon planning assistant at DuPont in Wilmington, Delaware. . . . **James D. Clark** is a marketing product manager for Xerox Corp. in Dallas, Texas. . . . **Robert F. Grenier** was recently elected vice president for engineering at Quabaug Rubber Co., North Brookfield, Mass. He joined the firm as a plant engineer in 1968. . . . Dr. **Francis E. Kennedy, Jr.,** is an assistant professor of engineering at Thayer School of Engineering, Dartmouth College, Hanover, N.H. . . . Dr. **Frederick L. Kubick,** who earned his PHD in physics from the former Polytechnic Institute of Brooklyn, is currently employed as a sonar systems analyst and consultant at Sperry Rand Corporation, Systems Management Division, in Great Neck, N.Y.

1964

Dr. **Paul G. Amazeen** holds the post of director of engineering at Rohe Scientific Corp., Santa Ana, Calif. . . . **Richard R. Brown** has been promoted to the new post of manager of corporate information and advertising in the communications department at Data General Corporation, Southboro, Mass. He will be responsible for overall press relations, corporate advertising, employee communications and recruitment advertising. Previously he was manager of advertising and sales promotion. He began working for the firm in 1970 as a public relations specialist. . . . **Wade W. Cloyd,** SIM, has been promoted to the position of director of corporate communications for the American Optical Corp. He was the director of marketing services for the optical products division. Now he will be responsible for development and administration of communications policies and activities for the company. He joined AO in 1958 as a manager of sales promotion in the advertising department. Later he was manager of advertising and public relations and director of marketing services. . . . **Peter L. Dornemann,** business development manager for the Industrial Chemicals Division at NL Industries, Hightstown, N.J., has been slated to visit WPI as a company recruiter in February. . . . Currently Lt. Col. **David Y. Healy,** USMC, is stationed at El Toro, Calif. . . . Dr. **Steven D. Mittleman** is an assistant professor in the EE Department at the University of Maine in Orono. He received his PHD from Brown last year. . . . **Robert E. Mournighan** has accepted the position of day supervisor polymer at the Front Royal (Va.) plant of FMC Corporation. He recently joined the company as a process engineer in the Polyester Process Improvement Department. Earlier he was a process development engineer with the Goodyear Tire and Rubber Company where he was responsible for pilot plant development work and process trouble shooting in plant operations. . . . Dr. **Alfred R. Potvin,** chairman and associate professor of biomedical engineering at the University of Texas at Arlington, has been selected by NASA to participate as a life scientist at Ames Research Center, Moffett Field, Calif., for one year. He will investigate space motion sickness, one of the major biomedical problems in manned space flight.

. . . **John H. Schmidt** has received his professional engineering license in New York state. . . . Presently **Peter J. Tancredi** works as a component manager at Camp Dresser & McKee, Inc., Denver, Colorado.

1965

Born: to Mr. and Mrs. **John (Jack) Kelley,** their first son, last March. They also have a four-year-old daughter. Jack was recently promoted to construction division director at Stewart and Williams of Augusta, Me. He is responsible for the construction of $28 million worth of work now under contract. A professional engineer, he has been with the firm since 1970, serving as a construction project manager.

James Calvin works as a clinical psychologist at the National Naval Medical Center in Bethesda, Md. . . . **Paul L. Giusti** has assumed the position of sales manager for General Electric Company's capacitor products department which is located in Hudson Falls, N.Y. . . . **James B. Gustafson** serves as computer facilities manager at Chas. T. Main, Inc., Boston. . . . **Peter B. Kirschmann,** now a manager-manufacturing engineering for G.E., is located in Merrimack, N.H. . . . Dr. **Peter S. Welcker** serves as a chemist for duPont at their Washington (W. Va.) works.

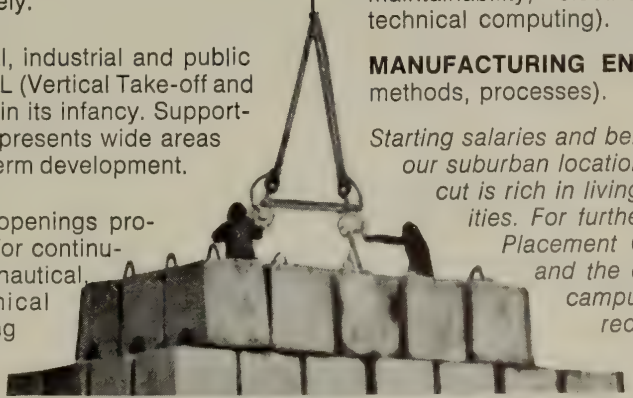
1975 ENGINEERING GRADUATES

SIKORSKY Helicopters help build a lot of things ...including exciting careers

Far more versatile than many people know, the helicopter provides scores of unexpected services. Specially designed craft by Sikorsky, for example, do workhorse chores in construction of many types. Frequently, they replace mobile cranes, and just as frequently perform heavy lifting tasks more effectively.

In the area of commercial, industrial and public service applications, VTOL (Vertical Take-off and Landing) craft is virtually in its infancy. Supporting technology, too, still presents wide areas for exploration and long term development.

Currently, Sikorsky has openings providing strong prospects for continuing career gains for Aeronautical, Electrical and Mechanical Engineers in the following areas:



DESIGN (aircraft structures; propulsion systems; transmissions; rotor, hydraulic & flight control systems; electrical/electronic systems).

TEST AND ANALYSIS (structural, loads, dynamic, stress, mass properties, reliability/maintainability; electrical/electronic systems; technical computing).

MANUFACTURING ENGINEERING (planning, methods, processes).

Starting salaries and benefits are excellent. And our suburban location in Stratford, Connecticut is rich in living and cultural opportunities. For further information, see your Placement Office for our brochure and the date of our forthcoming campus interviews. Or write directly to Mr. Leo J. Shalvoy, Professional Placement.

Sikorsky Aircraft

DIVISION OF UNITED AIRCRAFT CORP.

STRATFORD, CONNECTICUT 06602

An Equal Opportunity Employer M & F

. . . **John H. Zifcak** is now process group manager at the Foxboro Company plant in East Bridgewater, Mass. He is responsible for the production, materials, planning and engineering of the process lines which include etched circuit boards, cable and transformers. He has been with the firm since 1967 and has served as a staff assistant in development and engineering and as engineering manager at the East Bridgewater plant which manufactures electronic assemblies. Previously he taught high school physics and chemistry in Rhode Island.

1966

Married: **Robert B. Dolan** and Miss Mary S. Hussey recently in Manchester, New Hampshire. The bride, a teacher, graduated from Paul Smith Junior College and Notre Dame College, Manchester, N.H. The bridegroom is presently a product engineer with GTE Sylvania.

Krikor D. Gureghian serves as a senior process engineer at Fluor Corp., Los Angeles, Calif. . . . **Jonathan H. Pardee,** a general agent for Occidental Life Insurance Co. of California, also is an associate at G. Nolan Bearden Co. (insurance brokerage) in Atlanta, Ga. . . . **Lawrence A. Penoncello** has been appointed manufacturing manager of The Wire Mill Division at Torrington (Conn.) Co. Originally hired in 1967 as a manufacturing engineer at the Standard plant, he was transferred to the Broad St. plant in 1968 as a general foreman. Since that time he has been in overall charge of several departments. . . . **Carl E. Hellstrom** was recently named the principal regional transit planner for the Central Massachusetts Regional Planning Commission. He spent the past two years in the City Manager's Office of Planning and Community Development as a senior transportation planner and was active in the study leading to the creation of the Worcester Regional Transit Authority. Earlier he was an instructor at WPI.

1967

Born: to Mr. and Mrs. **William R. Hyatt** their second daughter, Anna Marie, on June 29, 1974. Bill is now employed by Stearns-Roger Engineering Company, Denver, Colorado.

Roger C. Binkerd is director of hydrographic studies at Aquatec in Burlington, Vt. Earlier he had worked for Stone & Webster in Boston and had served in the Peace Corps in Africa. The Binkerds have two children, Lisa, 4, and Chad, 3. . . . **Paul Cherubini** has been named vice president in charge of operations at the Standard Sign and Signal Co., Inc., in Clinton, Mass. He joined the company four years ago. He had been with the Carlson Construction Company in Cochituate and the Badger Engineering Company in Cambridge. . . . **Peter M. Herron,** a business planner at Hughes Aircraft, El Segundo, Calif., performs financial analyses and other business studies supporting the sale of commercial communications satellites. He received his MBA from the University of Denver last year. . . . **James C. Lefevre** is a self-employed land manager in the eastern United States. . . . **Douglas H. Pike** is studying for his PhD at Boston College . . . **William E. Tanzer** works as a project engineer at Eastman Gelatine Corp., Peabody, Mass. . . . **Wayne T. Wirtanen** has been appointed chief of the newly formed Water Compliance Section of the U.S. Environmental Protection Agency's regional enforcement office. He will be responsible for the technical aspects of compliance with national pollutant discharge elimination system permits including investigations for noncompliance and commencement of enforcement actions. Wirtanen is a registered professional engineer and has worked in the technical studies section of EPA's Surveillance and Analysis Division since 1972.

1968

Born: to Mr. and Mrs. **Marshall B. Taylor** a son, Prescott, on January 6, 1974. Marsh is manager of capital planning at Ryder Systems, Inc., Miami, Fla.

Kenneth D. Ekstrom recently took part in an expedition off the North Coast of South America. He is with the department of oceanography at the University of Rhode Island in Kingston. . . . **Stephen M. Holub** is regional sales engineer at Union Carbide/Linde Division, in Houston, Texas. . . . **Richard E. Makohon** is a student at the University of Alabama. . . . **Stephen M. Pytka** currently works in the Ordnance Department at General Electric in Pittsfield, Mass. . . . **J. Kevin Sullivan** holds the position of marketing manager at Stanley Hydraulic Tools in Clackamas, Oregon.

1969

Married: **Bruce M. Green** and Miss Patrice A. Piccolo on October 26, 1974 in Stonington, Connecticut. Mrs. Green graduated from Southern Connecticut State College and is a learning disabilities Teacher at Washington Junior High School in New Britain. The groom is a mechanical engineer-product engineer at Hartford Special Machinery Co. in Simsbury. . . . **Harold F. Hemond** to Miss Carol A. Thomson in Ledyard, Connecticut on August 10, 1974. The bride graduated from George Mason University and earned her MA at Connecticut College. Her husband, who received his MA in botany at Connecticut College, is now working for his PHD at M.I.T. Previously he was employed as deputy director of Water and Related Resources for the state department of Environmental Protection. . . . **Douglas H. Morash** amd Miss Denise Hillick of Ithaca, New York, on November 9, 1974. The groom is writing his thesis for a PHD in mechanical engineering from Cornell University.

Richard Alpert has been teaching at the Tehran American School in Iran. . . . U.S. Air Force Captain **Warren L. Anderson** has been certified as a missile combat crew commander at Grand Forks AFB, N.D. Capt. Anderson, a missile launch officer with more than four years service, was recommended for upgrading by his wing commander after meeting all training and evaluation requirements. . . . **Ralph N. Clemons** serves as an application engineer at Measurex Corporation in Portland, Maine. . . . **Joseph E. Fitzgerald, Jr.,** is now employed by Lockwood Greene Engineers, Inc., Spartanburg, S.C. . . . **Alfred G. Freeberg** works for General Electric Co. in Pittsfield, Mass. . . . **Stephen Legomsky** is a student at the University of San Diego (Calif.) School of Law. . . . Also studying law is **Richard P. Romeo** who is at the University of Maine in Portland. . . . **Francis W. Skwira** writes that he left G.E. last April. Now he is permanently assigned in Atlanta with Ebasco Services, Inc. The Skwiras recently settled in their new house in Lilburn, Ga.

1970

Married: **George M. Iszlai** to Miss Karen D. Baker on October 5, 1974 in Nashua, New Hampshire. The bride attended UNH and graduated from Youville Hospital School of Nursing, Cambridge, Mass. The groom received his master's degree from UNH. . . . **Robert J. Killion, Jr.,** to Miss Sharon L. Orciani on October 27, 1974 in West Boylston, Massachusetts. Mrs. Killion graduated from Ollis Beauty Academy and is a hairdresser. Her husband is vice president of Killion Co., Inc., Worcester. . . . **James P. Troupes** and Miss Marlene M. Garbauskas on October 26 in Worcester. Mrs. Troupes attended Clark University. The bridegroom is the town engineer in Milford, Mass. . . .

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

What we're looking for hardest:

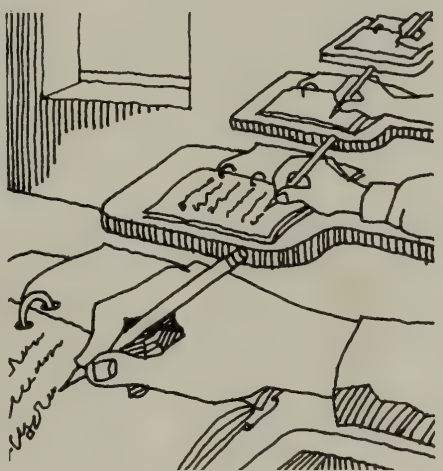
B.S. or M.S. in Ch.E.
B.S. or M.S. in M.E.

(Not that we want to scare off electrical engineers and industrial engineers. If you are one, ask us what's doing.)

Who could probably do better elsewhere:

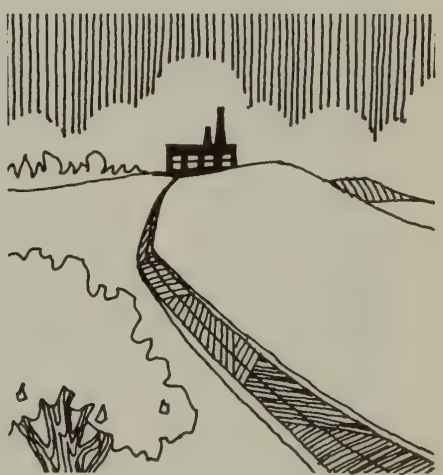
Prefers to live in no one locality for long.

(But we do often have openings for chemical engineers willing to migrate frequently while building a career in marketing.)



Wants lots more training before attacking real problems.

(We do try to scale your projects to your experience and beyond.)



Likes to keep a low profile.

(We don't operate as a collection of little plants scattered all over. You are in close daily contact with the big picture. You get to see where the interesting challenges are and to convince somebody you can meet them.)

Drop a note about yourself to
EASTMAN KODAK COMPANY
Business and Technical Personnel
Rochester, N.Y. 14650

Kodak

An equal-opportunity employer f/m

Kodak engineers find their opportunities without moving far from Rochester, N.Y., Windsor, Colo., Kingsport, Tenn., Longview, Tex., or Columbia, S.C.

Air Force 1/Lt. **Kenneth C. Bassmann** has been assigned to Ft. Meade, Md., for duty with a unit of the U.S. Air Force Security Service. He is a communications-electronics operations officer with the 6970th Air Base Group. Previously he was assigned at Takhli Royal Thai AFB, Thailand. He was decorated with the U.S. Air Force Commendation Medal for meritorious service in Thailand. . . . **Richard E. Bergeron** is with Engineered Specialty Products in Frazer, Pa. . . . **Wayne Eastman** works as a plant engineer at Allied Chemical in Columbia, S.C. . . . **Dom Forcella** writes: "I am an unemployed Czar recovering from a wound received from a flying vector." . . . **Peter G. Hancock** is a group manager at GTE Labs, Inc., Waltham, Mass. . . . **Ted Lelek** serves as a national accounts representative at Gulf Oil Chemicals Co., New York City. . . . **Bradford R. Myrick** is a design engineer at Improved Machinery, Inc., Nashua, N.H. . . . **Frank Pope, Jr.** currently works as a design engineer for Stein Associates, Waltham, Mass.

1971

Married: **Philip Cianciotto** to Miss Donna-Rae Pasch on September 14, 1974 in Rochester, New York. The bride graduated from Beloit College and is employed by Leach Steel Corp. Her husband is a chemist with Eastman Kodak Co.

Born: to Mr. and Mrs. **Richard Arena,** a daughter, Nicole, on May 28, 1974. Arena is a service specialist at Wyman Gordon, North Grafton, Mass.

Robert J. Allard, Jr., has accepted a new position as vice president of Croman Development Company in East Orange, N.J., one of the largest commercial real estate developers in that state. . . . **George J. Bakevich,** who recently left the U.S. Atomic Energy Commission, has accepted a position in the Safety Review and Appraisal Branch of Aerojet Nuclear Company. Bakevich is responsible for nuclear criticality safety and some health physics work. He is currently located in Atomic City, Idaho (population: 39). . . . **Thomas R. Copp** now serves as plant engineer at Rexnord, Inc., Maynard, Mass. . . . **Robert R. Dutkiewicz** holds the post of plant metallurgist at National Standard Co., Worcester Wire Division. . . . Dr. **Baljit S. Gambhir** is a research engineer at MTM Process Research & Development Laboratory, Deer Park, Texas. . . . **Jack B. Greenshields** was recently promoted to superintendent of purchasing and traffic with the Monsanto Commercial Products Company, Stonington, Conn. He is also a signal center platoon leader with the Connecticut Army National Guard, holding the rank of first lieutenant. . . . **William E. Helliwell, Jr.,** has been promoted to district service manager for the Riley Stoker Corp. of Worcester. Previously the resident service engineer in Denver, Colo., he will be servicing the Rocky Mountain District for Riley Stoker, a major manufacturer in utility and industrial steam generators and air pollution equipment. . . . **Emile P. Levasseur** works for G.E. in Lynn, Mass. . . .

John V. Marino is a graduate student at WPI. . . . **Robert A. Payne,** a partner in the firm, National Legal Supplies, is also working for his MBA at the University of Utah in Salt Lake City. . . . **Francis M. Scricco** is associated with the Boston Consulting Group, in Boston. . . . **John H. Sieczkos** works for General Electric Co. in Binghamton, N.Y. . . . **Thomas Weil** attends the University of Massachusetts in Amherst where he is studying for his MS in ocean engineering.

jamesbury
manufacturers of
Double-Seal Ball Valves
Wafer-Sphere Butterfly Valves
JFC Control Valves
Jamesbury Corp. • 640 Lincoln Street • Worcester, Mass. 01605

1972

Married: **Samuel T. Cuscovitch** to Miss Patricia H. Block recently. The bride is a graduate of Central Connecticut State College and teaches in South Windsor, Conn. Her husband, a data communications analyst at Aetna Life & Casualty in Hartford, has received his MS in information science from RPI. . . . **John D. Kaletski** and Miss **Gwynne E. Peterson, '73,** on October 19, 1974, in Boylston, Massachusetts. Mrs. Kaletski is a staff supervisor in the engineering department of American Telephone and Telegraph Co., White Plains, N.Y. The groom is a chemical engineer at Clairol, Inc., Stamford, Conn. . . . **Brennan R. McLaughlin** and Miss Linda T. Lombardo on October 12, 1974 in Wethersfield, Connecticut. Mrs. McLaughlin graduated from Becker and is a secretary at Blue Cross-Blue Shield in Worcester. Her husband works for Stone & Webster, Boston.

Born: to Lt. and Mrs. **John D. Powers** their first child, James Kern, on October 22, 1974. Now a first lieutenant in the U.S. Army, Powers was recently transferred from Nürnberg to Worms, Germany.

Samuel T. Davis is an industrial engineer at Sweetheart Plastics, Wilmington, Mass. . . . **James N. DeVries** is chairman of the science and mathematics department at Dayton (Ohio) Christian Schools, Inc. . . . **Mark A. Fritz** serves as a quality assurance engineer at Sanders Associates in Nashua, N.H. . . . **Neil C. Herring** has joined the Graham H. Blake Agency in Bradford, N.H., where he is a field representative for the Berkshire Life Insurance Co. of Pittsfield, Mass. Earlier he was sales manager in Bradford for a newspaper chain and served in the same capacity for WRLH-TV in Lebanon. . . . Presently **Patrick F. Lafayette** is an assistant project engineer at C.E. Maguire, Waltham, Mass. . . . **Kathleen F. McCarthy** is an instructor in computer science at WPI. . . . **Richard N. Panton** has been promoted to supervisor, continuous polymerization, at duPont's Spruance Plant, Richmond, Va.

John T. Poreda has joined the Ordnance Department at G.E. in Pittsfield, Mass. . . . **Gus Sannicandro,** SIM, of Milford, Mass., has been elected chairman of the Industrial Development Commission. For the past seven years he has served as secretary of the IDC. . . . **John E. Swanson,** now out of the Air Force, is working as an analytical design engineer at Pratt & Whitney Aircraft, East Hartford, Conn. He also serves in the Massachusetts Air National Guard in Westfield, Mass. and is an F-100 pilot. . . . **Bruce M. Szypot,** who was released from active duty in the army on July 30, currently works as an industrial engineer in the Industrial Engineering Department at Eastman Kodak Company in Rochester, N.Y. . . . **Donald A. Taft** is a graduate student at Harvard Business School. Recently, as a lieutenant with the 76th Engineer Battalion, he was awarded the Army commendation medal for service.

The dreams of engineers, ecologists, biologists and planners don't mean a thing until

we make them a reality!

There are people who talk about a better quality of life and people who *do* something about it. The Corps of Engineers gives you a chance to pitch in and *do* something important for the protection of our natural environment.

We need engineers, economists, planners, landscape architects, and others who are interested in the broad picture, who can bring a creative approach to meeting changing public needs. It's a chance to make your know-how count, working as a team.

As a Corps professional, you'll apply all the techniques of modern technology—systems analysis, computer technology, advanced materials research, and more—to the improvement of our construction capability. And you'll be a member of the *largest* engineering/construction team in the world.

If you want to get things done, start by writing to us *now*. We'll send you all the information you need to make a career of it, with *us*.

An equal opportunity employer m/f

CORPS OF ENGINEERS

Department of the Army, Washington, D. C. 20314

1973

Married: **William J. Ierardi III** and Miss Christine E. Ketchel on November 15, 1974 in Hamden, Connecticut. The bride is a licensed practical nurse. . . . **Donald H. Kray** to Miss Kathleen M. Sharry on October 5, 1974 in Worcester. Mrs. Kray is an administrative underwriter for Aetna Life & Casualty Co. The groom is an analyst for the same company in Hartford, Conn. . . . **William B. Smith, Jr.,** and Miss Mary Elizabeth Magee in Glenbrook, Connecticut on October 19, 1974. The bride is a graduate of Southern Connecticut State College. She and her husband are both associated with the Putnam Trust Company. . . . **Anthony R. Urjil** and Miss Robin Saltzman in Hartford, Connecticut on November 3, 1974. Mrs. Urjil is a Becker graduate. The groom is a sales engineer at Morse Chain Co.

Ben G. Allen is associated with Woods Hole (Mass.) Oceanographic Service. . . . **Crane D. Allen** is presently an electronics engineer with the Naval Underwater Systems Center (N.U.S.C.) in New London, Conn. N.U.S.C. is responsible for the development of sophisticated underwater detection, ranging and weapons systems for the U.S. Navy. . . . **Philip N. Ciarlo** has been employed by General Electric in San Jose, Calif. **Lawrence Dzaugis** works at Reed Rolled Thread Die Co., Holden, Mass. . . . **Bruce J. Foster** and **William T. Nutter** are with the Ordnance Department of General Electric in Pittsfield, Mass. . . . **Robert C. Haywood** is a proposal coordinator at Perkin-Elmer Corp. (Electro-Optics Div.) in Wilton, Conn.

Roger J. Heinen, Jr., is a programmer for Digital Equipment Corp., Maynard, Mass. . . . **Richard L. Kirk** holds the post of associate engineer at Galileo Electro-Optics, Sturbridge, Mass. . . . **Dale R. Ladysh** is a technical engineer at E.I. duPont & Co., Memphis, Tenn. . . . Airman First Class **Philip C. Mazzie** is a member of a unit that recently received the U.S. Air Force Outstanding Unit Award. He is a telephone equipment repairman at Wright-Patterson AFB, Ohio, with the 2046th Communications Group that was cited for meritorious service. . . . **Martin J. Sklar** is studying at Thayer School, Dartmouth College, Hanover, N.H. . . . **Edward M. Small** works as a junior engineer at Camp Dresser & McKee in Boston. . . . **John Taylor** writes that he is employed at the Echlin Manufacturing Co. in Branford, Conn., where he serves as an automotive emissions test lab supervisor.

1974

Married: **Michael J. Boyden** and Miss Sandra Jo Bishop on August 31, 1974 in Cape Vincent, New York. **John Young** served as best man. Mrs. Boyden, a physical therapist, recently registered in the state of Connecticut, is a graduate of Russell Sage. Her husband is an office engineer at a Stone & Webster field office, Millstone Nuclear Power Project, in Waterford, Conn. . . . **Gerald G. Buzanoski** to Miss **Kara B. Hogan** in October in Framingham, Massachusetts. The bride is with Nisco Co., Cherry Hill, N.J. and the groom with General Water Company, Toms River, N.J.

. . . **Kenneth Charak** to Miss Adrienne B. Lewis in West Hartford, Connecticut on October 27, 1974. Mrs. Charak graduated from Southern Connecticut State College and is employed by Midwestern Indemnity, Cincinnati. Her husband is employed by Procter & Gamble.

Married: **James K. Ellsworth** to Miss Valerie L. Molnar on September 21, 1974 in Warrenville, Connecticut. The groom is a testing engineer at Pratt & Whitney, East Hartford, Conn. . . . **William H. Murwin, Jr.** and Miss Eileen D. Hubbard on October 12, 1974 in Oneonta, New York. The bride graduated from Barrington College and did graduate work at the State University College of Oneonta and the Presbyterian School of Christian Education, Richmond, Va. The bridegroom is a computer programmer with State Mutual Life Assurance Co., Worcester. . . . **John F. Noreika** to Miss Carole Lynn Sampson in Worcester on October 5, 1974. The bride is employed at Morgan Construction Co. Her husband is a civil engineer at Alden Research Laboratories, Holden. . . . **Stanley J. Piekos** to Miss Mary Lou Geran on September 14, 1974 in Worcester. The bride graduated from Becker and is a social service assistant in Randolph. The groom works for Foster Wheeler Energy Corp., Livingston, N.J.

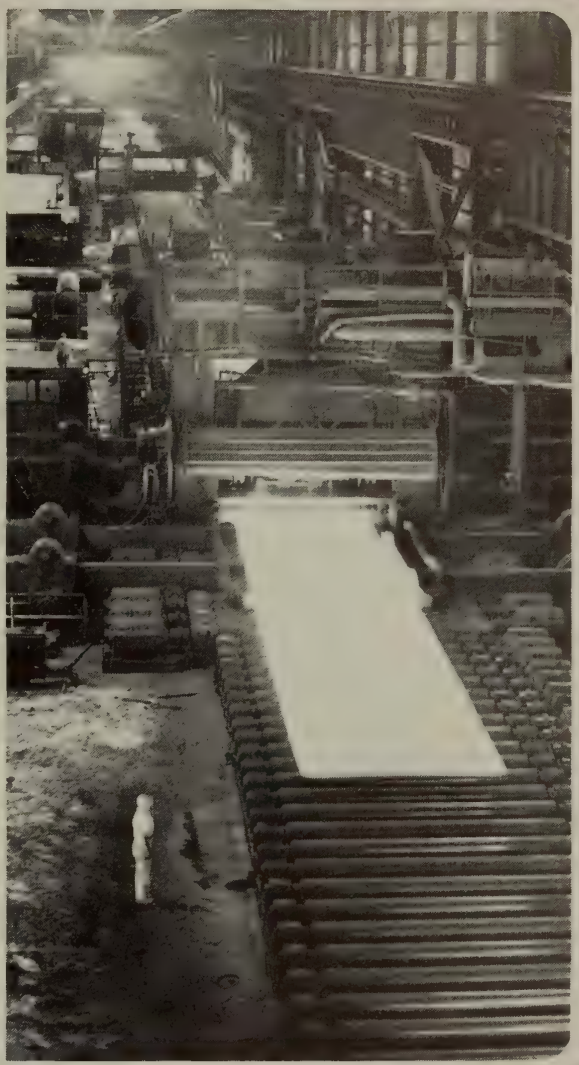
Married: **Robert Trotter** and Miss Robin Golden on October 26, 1974. Mrs. Trotter graduated from Becker. The bridegroom is employed by American Bosch/AMBAC as a project engineer and is also working towards his master's degree by taking evening courses at the University of Massachusetts. . . . **Lee D. Turner** and Miss Karen A. Gagnier in August in Jackson, Michigan. **Leonard Brzozowski** served as best man and **Garry Balboni, Lawrence Martiniano, Peter Thacher** and **John Young** as ushers. Mrs. Turner is a graduate of Eastern Michigan University. Her husband is a graduate student at Dartmouth. . . . **Charles M. Waldron** to Miss **Irene B. Jordan** in West Hartford, Connecticut on October 4, 1974. Mrs. Waldron is employed by Badger Co., in Cambridge. The bridegroom works as an actuary for Union Mutual Life Insurance of Portland, Maine. . . . **Robert R. Wood, Jr.** and Miss Kathryn L. Wicks recently in Reading, Massachusetts. The bride is a junior at the University of Massachusetts. Her husband is with Ingersoll-Rand in Wellesley.

Homoud A. Al-Rqobah is employed by the government of Kuwait in distillation plants which make fresh water out of sea water. . . . **Dennis A. Anctil** is a graduate student at Northeastern University, Boston. . . . **Jonathan R. Barnett, Robert E. Lindberg, Mark A. Wendell, Danielle M. Chouinard** and **Glenn E. Haringa** are doing graduate work at WPI. . . . **Gary R. Bellinger** has accepted a position with Uniroyal in Naugatuck, Conn. . . . **Neil E. Billings** works at Stone & Webster in Boston. . . . **James W. Bowen** is with the Torrington Co. in Connecticut. . . . **John H. Canatsoulis** attends graduate school at the University of Michigan. . . . **Louis F. Ciercielli** works for General Electric Co. in Fitchburg, Mass. . . . **Keith C. Coakley** is with Hamilton Standard, Windsor Locks, Conn.

Steven D. Dettman has joined Norden Aircraft, Norwalk, Conn. . . . **Robert C. DiGiovanni** is doing graduate work at WPI. . . . **Mathew A. DiPilato** is a staff engineer at Geotechnical Engineers, Inc., Winchester, Mass. . . . **Robert O. Dupuis** has been employed by Stone & Webster, Boston. . . . **James F. Edwards** is a graduate student at the University of Connecticut in Storrs. . . . **Robert W. Flanagan, Jr.** and **David O. Scott** are serving in the U.S. Army. . . . **William F. Frazier** and **Paul E. Nordstrom** attend graduate school at Northeastern University in Boston. . . . **Joseph H. Gaffen** works for United Engineers & Constructors, Inc., Boston. . . . Western Electric, New York City, has employed **Howard B. Greene.** . . . **William G. Gunther** has accepted employment at George Schmitt & Co. in Branford, Conn. . . . **Alan R. Hahnel** is employed by United Engineers and Constructors, Inc., in Boston. . . . **Dan Hartford** serves as a programmer at Syntex Corp., Palo Alto, Calif.

Lawrence R. Hayden is a graduate student at WPI. . . . **Ralph N. Isabella** is a methods engineer at Ingersoll-Rand in Athens, Pa. . . . **Richard J. Karpf** is a graduate student at Columbia University in New York City. . . . **Chester A. Kokoszka** has been employed by Northeast Utilities, Wethersfield, Conn. . . . **James A. Kudzal** has enrolled in graduate school at the University of New Hampshire. . . . **Bruce Lackey** holds the post of regional sales manager at GCA/McPherson Instrument Corp. in Acton, Mass. . . . **Ronald M. Lafreniere** works for the town of Marlboro, Mass. . . . **Gretchen Lapidus Lobo** is doing graduate work at M.I.T. . . . **George M. Leanna, Jr.** holds the position of engineering manager at M. G. Poulin Construction Co., Inc., Sterling, Mass. . . . **Edward J. Ledden** is studying at Tufts University School of Dentistry in Boston.

supertankers, sure!



We design and build them. And we also roll the steel plates they're made from.

Bethlehem has lots of projects "on the ways"—not all are related to shipbuilding. And there are plenty of opportunities for engineers to launch meaningful careers.

We need a good crew to keep moving full speed ahead—in shipbuilding and ship repair work, in ship engineering and design; in production supervision, in quality and process control assignments in our steel plants; and in many other technical areas. Why not explore *your* chances of signing on with Bethlehem?

Watch for our recruiter's visit. Meantime, pick up a copy of our booklet "Bethlehem Steel's Loop Course" at your placement office. Or write: Director—College Relations, Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL

an equal opportunity employer

Dr. **George K. Lewis** serves as a research engineer in cardiology at Searle Co., Des Plaines, Illinois. . . . **Jeffrey C. Lindberg** is a graduate student at the University of Virginia in Charlottesville. . . . **Bruce R. Lyon** works at Texas Instrument Co. in Dallas, Texas. . . . 2/Lt. **James J. Martin,** a student pilot in the U.S. Air Force, is located in Valdosta, Ga. . . . **Wayne A. Massie** has been employed by Westinghouse Electric Corp. . . . **William E. McBride** recently joined Municipal Light & Power in Anchorage, Alaska. . . . **Gerald P. McCullough** is a factory and field engineer at General Electric in Fitchburg, Mass. . . . **Steven L. McGrath** is employed at the University of Pennsylvania Computer Center in Philadelphia. . . . **Richard E. Mellor** works for G.E. in Schenectady, N.Y. . . . **Angelo J. Mitsis** is with New England Electric, Westboro, Mass. . . . **Mark E. Munson** serves as a research assistant at Maine Medical Center in Portland.

Harvey B. Neilson has joined Raytheon Co., Sudbury, Mass. . . . **Gary E. Nunes** is with Stone and Webster in Boston. . . . **Janice E. Painter** teaches biology in Wilton, Conn. . . . **John Palitsch** currently works for Wyman Gordon. . . . **Thomas M. Palumbo** attends graduate school at Syracuse (N.Y.) University. . . . **Harry Paskali** is associated with Uniroyal, Inc., Naugatuck, Conn. . . . **Lawrence D. Patty** works at Newport News (Va.) Shipbuilding. . . . **Richard M. Peterson** is a graduate student at Princeton University. . . . **Peter J. Petroski** attends graduate school at Purdue University, Lafayette, Ind. . . . **Robert Plonsky** recently joined Monsanto Co. . . . **Neil Poulin** is with IBM. . . . **George F. Ranney** serves as a process engineer for E.I. duPont de Nemours & Co., Belle, W. Va.

Stephen J. Remen is associated with United Illuminating in New Haven, Conn. . . . **Elizabeth Ronchetti** works for Western Electric Co. . . . **James F. Rubino** is with Torrington (Conn.) Co. . . . **Carl D. Rydman** has joined Chas. T. Main, Boston. . . . Dr. **Alice Ann Sayler** serves as a postdoctoral research associate in the chemistry department at Cornell University in Ithaca, N.Y. . . . **Stephen R. Skutel** has been employed by State Mutual Life Assurance Co., Worcester. . . . **Robert D. Slack** is a development engineer at Fiber Industries, Inc., Salisbury, N.C. . . . **Matteo Solitro** is an employee at Monsanto Co. in Indian Orchard, Mass. . . . **William J. Stafford** serves as an engineer in training at Foundation Consulting Engineers, Inc., Columbia, S.C. He is also a graduate teaching assistant at the University of South Carolina. . . . **Richard M. Takanen** has been employed by General Electric Co., Cincinnati, Ohio. . . . **William P. Tanguay** is with Hammond Organ Co., Chicago, Ill. He is going to graduate school evenings at Illinois Institute of Technology. . . . **David M. Teixeira** does graduate work at Stanford (Calif.) University. . . . **Jay K. Thayer** is now employed at Yankee Atomic Electric Co., Westboro, Mass. . . . **Stephen N. Thibodeau** attends graduate school at the University of Washington in Seattle. . . . **Stephen J. Yankum** does graduate work at Northeastern University. . . . **Glenn S. Yee** is a sales engineering trainee for General Electric in New York City

George K. Howe, '01, passed away on October 27, 1974 in Savannah, Georgia.

He was born on July 5, 1877, in Worcester and graduated with a BSME from WPI in 1901. During his lifetime he was an instructor at Oklahoma A & M College; a professor of mathematics at Atlanta University, where he also served as acting dean; and treasurer and business manager at Tougaloo College. Later he was associated with Bell Aircraft Corp. and Lockheed Aircraft in Marietta, Ga., from which he retired in 1954.

Mr. Howe belonged to the Mathematical Association of America. He was the cousin of Edward A. Hanff, '10.

Harrison G. Brown, '12, secretary-treasurer of the Tech Old-Timers Club,7 passed away on November 12, 1974, in Worcester. He was 84 years old.

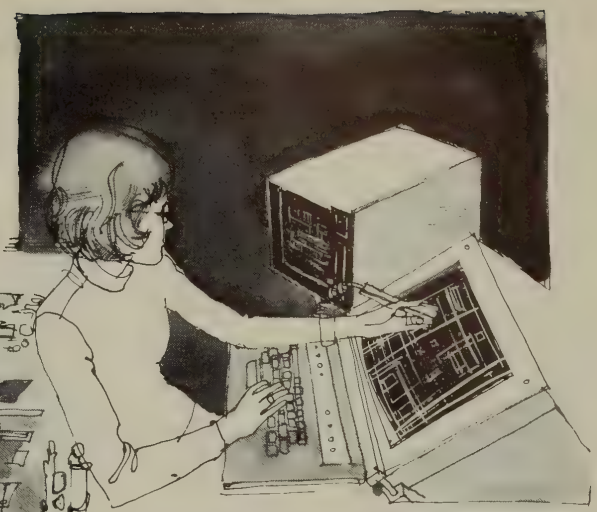
Born on December 30, 1889 in Lowell, Mass., he later graduated with a BS in electrical engineering from WPI. Following graduation he joined the Western Electric Co. as an installer. During his career he was associated with General Electric Co., Worcester Electric Light Co., Reed & Prince Mfg. Co. and Norton Co., Worcester. From 1923 until he retired in 1956, he was a standards engineer for Crompton & Knowles Corp. in Worcester.

Mr. Brown was secretary-treasurer of the Hadwen Park Improvement Association and a past commander of the Sons of Union Veterans. A member of the Wesley United Methodist Church for 65 years, he also belonged to the Masons. He was the father of Harrison K. Brown, '39.

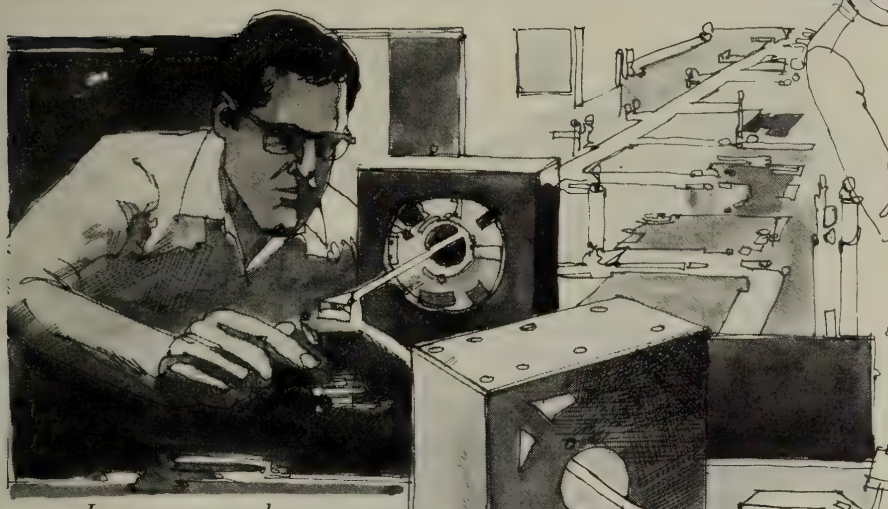
Albert L. Humphrey, '12, died on June 17, 1974, in Middleboro, Massachusetts.

He was born on May 5, 1889 in Rochester, Mass. After graduating as an electrical engineer from WPI, he worked as an inspector for the Factory Insurance Association in Hartford, Conn., later holding the same position with Phoenix Insurance Co. of Hartford. For over 35 years he operated his own insurance and poultry-raising business in Rochester.

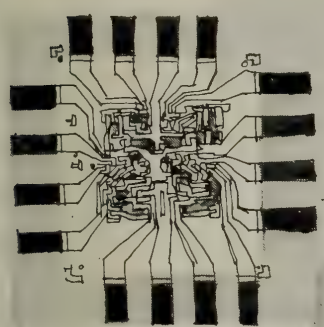
At Western Electric, we put science to work.



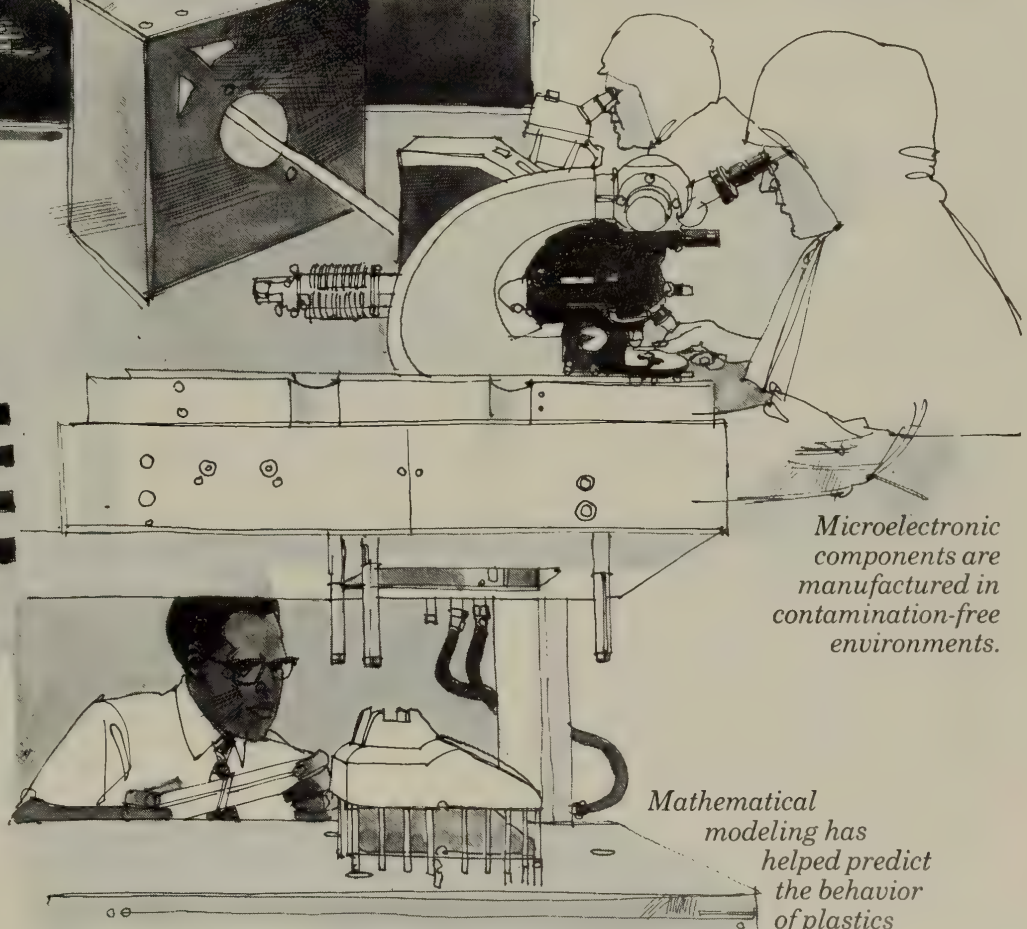
The installation diagrams for telephone switching centers have been generated through computer graphics.



Lasers are used in a variety of ways—from measuring to drilling and welding.



Like transistors before them, integrated circuits are spreading into every nook and cranny of the Bell System.



Microelectronic components are manufactured in contamination-free environments.

Mathematical modeling has helped predict the behavior of plastics in injection molding.

Managing all this is a new breed of talented people. Whatever their specialties, they also have to be comfortable working in other fundamental disciplines once left only to "pure scientists". At Western Electric, we put science to work.

Western Electric

We make things that bring people closer.

Ernest A. Peel, '20, a retired president of the former Plantations Bank of Rhode Island, died on November 13, 1974, in Warwick at the age of 76.

He served as president of the Plantations Bank from 1961 until his retirement in 1963. His financial career included work in the investment field. He joined an investment firm shortly before the 1929 stock market crash and stayed in the business through the depression.

He was born in Fall River, Mass. on January 12, 1898, later studying at WPI. He was first associated with the Rhode Island Hospital Trust Co. as a clerk, then became office manager at MacColl, Fraser & Wheeler in Providence. In 1941 he was named comptroller of the Morris Plan Company of Rhode Island, a firm which at the time dominated the consumer credit business. Three years later the company converted to the Morris Plan Bank of Rhode Island with Mr. Peel as vice president-treasurer. In 1947 the bank changed its name to Plantations and he was named, vice president, then director and president.

Mr. Peel, a member of ATO, was past president of the Consumers Bank Association of New England and the Providence Clearing House. Also he had been a vice president of the Rhode Island Bankers Association and a trustee for the Big Brothers of Rhode Island.

Charles C. Hutchins, '21, died on September 16, 1974, in Ridgway, Pennsylvania at the age of 74.

He was born in Boston on January 11, 1900. After receiving his BSEE from WPI, he was associated with Westinghouse Electric and Manufacturing Company in Pittsburgh, Pa., where he was a designer of generators and motors. During his career he was employed as principal designer at Elliott Company in Pittsburgh. Later he was general manager of the Ridgway Division of Elliott.

During 1945 he was on a special mission with the Joint Intelligence Objectives Agency in Germany, Switzerland and France. Later he was a consulting engineer for various companies.

Mr. Hutchins served with International Executive Service Corps, Trafo Equipmentos, Ltd. of Porto Alegre, Brazil in 1967 and in 1970, 1971 and 1972 in Tunis, Tunisia with S.A.C.E.M. He was a past president of the Rotary Club in Ridgway.

Kenneth G. Knapp, '28, died at his home in Bradenton, Florida on September 8, 1974.

He was born on January 7, 1906, in Worcester and graduated from WPI as an electrical engineer in 1928. He had been employed at Westinghouse Electric, Chicopee Falls, Mass.; Bell Telephone Laboratories, New York City; and Western Electric Co., Allentown, Pa., where he was a planning engineer.

Alton B. Wyman, '33, died in Chillicothe, Ohio on September 9, 1974, at the age of 62.

He was born in East Burke, Vt., on May 2, 1912 and graduated as a civil engineer from WPI in 1933. During his career he was associated with D. E. Gardner Co., S. Monroe & Son, and C. A. Yeager, contracting firms in Portsmouth, Ohio.

From 1938 until 1941 he served as a planning engineer for the city of Portsmouth, later becoming an architectural engineer in Ft. Knox, Ky. He was a World War II veteran and a past secretary-treasurer of the J. H. Butt Company, Inc., in Chillicothe.

Mr. Wyman, a registered professional engineer and surveyor in Ohio, belonged to Phi Sigma Kappa, Tau Beta Pi, ASCE, NSPE and Sigma Xi.

Robert N. Pim, '44, of Media, Pennsylvania, passed away on April 23, 1974.

A native of Philadelphia, he was born on May 29, 1921. For a number of years he was associated with Sun Oil Co. in Philadelphia. He was a member of Phi Gamma Delta fraternity.

Arthur H. Zefting, '44, of Rochester, New York died on September 17, 1974, following a three-month illness. He was 53.

He was born in Hartford, Conn., attended Hillyer Junior College and was graduated from WPI as an electrical engineer. He served with the U.S. Navy and for five years was employed by the National Bureau of Standards. During most of his career he was in engineering management with General Dynamics/Electronics.

Mr. Zefting belonged to IRE and the National Security Industrial Association. He was a past vice president of the Rochester-Genesee chapter of the Alumni Association.

G. Wayne Gibbs, Jr., '70 SIM, died on October 28, 1974 in Worcester. He was 48 years old.

He was sales manager for David Clark Co., Inc., Worcester, since 1958. A native of Fitchburg, Mass., he was born on October 12, 1926. He belonged to the Air Force Association of Worcester and served as treasurer of Boy Scout Troop 178 in Holden.

What's happening at WPI?

Athletics

(*designates home games)

Basketball

March 1 Clark, 8 pm*
10 (women's) Assumption, 6 pm

Swimming

March 7-9 New Englands at Brown

Skiing

March 1-2 Suicide Six at Babson

Track

February 28-
March 1 (indoor) New Englands at Tufts and Northeastern
April 8 Coast Guard, 3 pm*
12 Bentley, Lowell, Nichols, 2 pm*
16 Worcester State, Clark, Assumption, 3:30 pm*
19 Colby, Norwich, 2 pm*
26 M.I.T., 12:30 pm
30 Tufts, 3:30 pm*

Golf

April 4 Coast Guard, 1 pm*
10 Trinity, 1 pm*
15 Bentley, Providence, 1 pm
17 Babson, M.I.T., 12:30 pm*
21 Holy Cross, Assumption, 1 pm*
23 Amherst, UMass, 1 pm
25 Clark, Tufts, 1 pm
29 Lowell Tech, 1 pm

Tennis

April 8 Clark, 2 pm*
10 Assumption, 2 pm
12 Bentley, 3 pm
16 Holy Cross, 1:30 pm*
19 Babson, 2 pm*
21 Coast Guard, 2 pm*

Baseball

April 11 Wesleyan, 3 pm*
12 Clark, 2 pm
16 Brandeis, 3 pm
18 Trinity, 3 pm*
19 Hartford, 1 pm*
22 A.I.C., 3 pm
26 Lowell Tech, 1 pm
29 Tufts, 3:30 pm*

Films

(all in Alden Memorial Auditorium)

March 4 **"Shoot the Piano Player,"** 7:30 pm
March 11 **"Socrates,"** 7:30 pm
April 8 **"A King in New York,"** with Charles Chaplin, 7:30 pm
April 15 **"Conrack,"** 7:30 pm

Concerts

March 3 **Alexander's Feast,** medieval and renaissance music, Alden, 8 pm
March 6 **Steve Dacri's magic,** Riley Hall Coffeehouse, 8 pm
March 8 **Glee Club** with Smith College, Alden, 8 pm
April 12 **Glee Club** with Skidmore College, Alden, 8:15 pm
April 14 **Hersh and Montgomery,** ragtime and salon music in the Grand Tradition, Alden, 8 pm

WPI Colloquium

March 5 **"The National Wind Generator Program,"** Ronald L. Thomas, head of the federal Wind Energy Office, Olin 107, 4:30 pm
April 2 **"The Role of Technology,"** Dr. Edward Teller of the University of California, Olin 107, 4:30 pm
May 7 **"The Hydrogen Fuel Economy,"** Dr. Lawrence W. Jones of the University of Michigan, Olin 107, 4:30 pm

Other notable occasions

February 28-
March 1 Winter Weekend
March 20-
April 2 No classes, between terms
April 18-19 Spring Weekend

APRIL 1975

WPI journal

WPI journal

Vol. 78, No. 6 April 1975

3 **On the hill**
Honors, awards, a new face, and a difference of opinion

5 **Feedback**

7 **Sports**
Wrestling promise from a first-year student, and highlights of the sports season past

10 **A private university in a public world**
Higher education in Massachusetts — the privately supported institutions and the tax-supported schools, how they get along in increasingly difficult times.

15 **Your class and others**

24 **Roses are red, violets are blue, sugar is sweet, and lemons are too!**

28 **Completed careers**

31 **Nominees for Alumni Trustee state their position**

ditor: H. Russell Kay

lumni Information Editor: Ruth A. Trask

ublications Committee: Walter B. Dennen, ., '51, *chairman;* Donald F. Berth, '57, Rob- t C. Gosling, '68; Enfried T. Larson, '22; oger N. Perry, Jr., '45; Rev. Edward I. wanson, '45

esign: H. Russell Kay

/pography: Typesetting Service, Provi- ence, Rhode Island

'inting: Davis Press, Worcester, assachusetts

Address all correspondence regarding editorial content or advertising to the Editor, *WPI Journal,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI Journal* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1975 by Worcester Polytechnic Institute; all rights reserved.

The *WPI Journal* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster:* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI Alumni Association

President: W. J. Bank, '46

Vice President: F. S. Harvey, '37; W. A. Julian, '49

Secretary-Treasurer: S. J. Hebert, '66

Past President: I. J. Donahue, Jr. '44

Executive Committee Members-at-large: B. E. Hosmer, '61; D. F. O'Grady, '30; D. M. McNamara, '55; L. Polizzotto, '70

Fund Board: W. J. Charow, '49, *chairman;* L. H. White, '41; G. A. Anderson, '51; H. I. Nelson, '54; P. H. Horstmann, '55; D. J. Maguire, '66

by the editor

Skull-duggery on campus

The Skull, WPI's undergraduate honor society, has tapped a new group of people for membership this year, and they include two of WPI's administrative staff with whom students have been in daily contact for many years. The two are Vinnie Peterson, the campus printer, and Nils Hagberg, night supervisor of Buildings & Grounds.

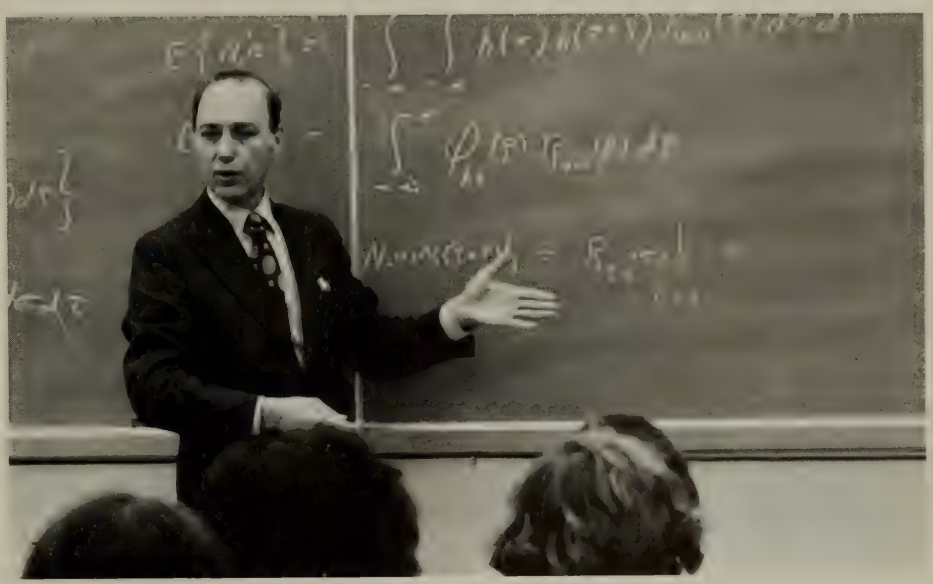
Nils, who has been associated with WPI for 40 years, recalls his notice. "A bunch of Skull members approached me, and I figured they wanted to get into the tower in Boynton so I reached for my keys. Then someone whacked me across the back, I turned, and there was Bob Wagner grinning from ear to ear, saying 'Welcome to the Club.' "

Will PIRG be purged once again?

There has been a strong movement on campus this year to establish a chapter of Mass PIRG. The initials stand for Public Interest Research Group, and the organization is an outgrowth of Ralph Nader's consumer movement leadership of the late 1960s. This is the second attempt to establish a PIRG chapter on campus; an election held three years ago failed to muster the necessary majority of student votes in support.

Basically, PIRG (which has twenty-three state organizations across the country) relies on the collection of $1 per student per term to support a variety of research activities dealing with injustices to the consumer. The organization has tackled a wide range of issues, from attacking the ban on advertising prescription drugs, to fighting superhighway construction without appropriate environmental impact studies, to opposing the retail sale of toys which have been proved unsafe.

The $4 per student fee has triggered a very vocal opposition. The fee, which is to be automatically added to the Student Activities Fee twice a year, is refundable to individual students who do not wish to participate. This "negative option" feature has been decried as "guaranteeing membership" to a campus organization, even from students who don't wish to be involved but who don't make the necessary request to get their money back.



Romeo Moruzzi gets Trustees' Award

There are many ways of recognizing the efforts and achievements of faculty members: promotion and tenure, of course, and appointment to an endowed faculty chair. But perhaps the most treasured of these at WPI is the single award which is made annually – the Trustees' Award for Outstanding Teaching. This award more than any other affirms the high regard in which teaching is held at WPI. It carries an honorarium of $500 and permanent recognition on an engraved plaque and photographic display in Boynton Hall.

To no one's real surprise and to the delight of most, the 1975 award has been given to electrical engineering professor Romeo L. Moruzzi.

A WPI faculty member since 1954, Moruzzi was instrumental in the faculty team which designed the WPI Plan in the late 1960s. In addition, he served as acting dean of faculty in 1972-73 when M. L. "Cookie" Price retired early for health reasons. Although serving only temporarily (by his own wishes), his leadership was crucial in implementing the WPI Plan at a time when transition from the old system was really just beginning, and every day brought a fresh crop of problems and headaches. His real love, though, was and is teaching, and in this regard he exemplifies the spirit and the strength of WPI.

When dean of faculty Ray Bolz announced the award at a recent faculty meeting, Romeo was given a standing ovation.

Proponents of the PIRG chapter believe its presence will increase the effectiveness of much interactive project work by providing a statewide framework in which the results of student work can be carried forward in terms of legislation and public information.

As this issue of the JOURNAL goes to press, the question is still undecided.

New face in the alumni office

To help with the greatly expanded range of services provided to alumni by the Alumni Association, Michael A. Ahearn has joined the University Relations Office as assistant to Association secretary-treasurer Stephen J. Hebert, '66.

A graduate of Amherst College, Mike received an MBA from Boston College last December. He will be working with many of the newer programs and services of the Association, including group travel arrangements, the Alumni Fund and the Phonothons, chapter meeting arrangements, an alumni admissions program, and alumni placement.

The Kaplan Confrontation

The following letter appeared in the March 4 issue of the student weekly *Newspeak.*

To the editors: For the promotion of an expanded enrollment which in turn necessitated an expanded curriculum, and for the sake of the subversive liberals' love for drama and classical music, a new system (the Plan) was implemented at WPI. The academic excellence of WPI, attained through over 100 years of inspired and devoted diligence, became the sacrificial lamb to the new system. The writer believes this new system of the subversive liberals actually does undermine the time-tested academic excellence of the physical sciences, mathematics, and engineering departments. WPI is becoming an educational institution which is sacrificing quality (i.e., academic excellence achieved through concentration in a limited sphere) for quantity (i.e., a broadened and diluted curriculum which caters to the taste of subversive liberals and at the same time vitiates the established academic foundation. One student letter states: "subversive liberal arts type people . . . we must get rid of these people." This student statement provides a viable solution for arresting the incipient decay. A purge might be necessary. WPI might then be able to reestablish its shaken academic excellence and consequently reestablish its once proud role as a constructively progressive force within the global society.

Another student letter states: "any new system will have problems." In the case of WPI's new system, that is an understatement. The most serious problem is, as stated above, the vitiation of the long-established academic foundation. The expansion and liberalization of both the curriculum and student body has created the greatest identity crisis in the history of WPI. The change in the methodology of teaching — from a classical approach to a "do your own thing" approach — has also contributed to WPI's identity crisis. An alumnus returning to WPI could rightfully wonder if in essence it is still the WPI he knew, respected, and loved. For after 100 years, WPI is no longer WPI.

Another problem is that money, money, and more money is continually needed to feed what seems to be a self-consuming expansion. Just how much money should alumni pour into a new system — an untested system — a system which could be an unattainable pipe dream? The expansion caused by the new system has also created an unparalleled strain of the 100-year-old symbiotic relationship between WPI and the city of Worcester. Another problem.

To conclude, the writer believes that WPI must do some real soul-searching. Admitting one's mistake is painful but not to do so could be catastrophic.

—Marshall Kaplan, CHE, '67

The following letter has been selected from several student responses to Mr. Kaplan's letter.

To the editors: After reading Marshall Kaplan's letter, I only wish I could laugh. But I can't. Kaplan is attempting to judge a program whose benefits he can't understand.

Certainly, the Plan's roots were economic in nature. In a time of economic difficulty, a school needs something to stand out from the others. But if the Plan truly downgraded the school, why would it encourage students to attend it? Students seeking an easier workload can go to Worcester Junior College.

Projects in Washington are not "vacations." Knowing a formula is nice, but a five-year-old can memorize a derivative. The purpose of projects is to apply the knowledge gained in the classroom, and application is what the "real world" is all about.

Far from ending 100 years of excellence, WPI has ended a 100 year rut. WPI was founded knowing the importance of application; that's why the Washburn Shops were built. No other engineering school of its day shared this philosophy. The plan is simply updating this idea to the 1970s.

WPI realized the need for a change through [among other things] a meeting with [an industrial organization]. "How

can we make our scientists and engineers better? the question was asked. [The firm] stated that, certainly, engineers knew formulas, but they didn't know how to apply them, they didn't know how to work with others, and, most importantly, they didn't know how to think.

Thinking is important in today's complex world. *Memorizing* the circuit for a 16K bit ram will do no one any good since it will probably be obsolete by the time of graduation. *Understanding* how the circuit was developed has lasting value. Knowing some basics, and being able to think so that one can derive more, is far more valuable than knowing everything as it exists today.

And what of the liberal arts? Engineers must know engineering eight hours a day. But they must be human beings all twenty-four. A robot or a computer is programmed only with what it needs to know to perform its function. A human, to be human, must have more than a "function." As a 45-year-old Massachusetts computer programmer said in a *Boston Globe* interview: "I'm trapped. . . . I like the people I work with . . . it's just that I don't care about it. I spend eight hours a day, five days a week doing . . . a nebulous sort of project that I feel can never be accurately resolved. . . . What's wrong with just being alive? . . . What we're doing is meaningless. . . . I want to be able to look at my watch and have it be 5 o'clock and not realize where the time went."

George Rostky, editor-in-chief of *Electronic Design*, said in his February 15, 1975, editorial, "The Foreign Engineer": "European engineers have great respect for American engineers — as *engineers*. But they find it hard to believe that an American engineer might read a book without equations. They can't picture an American engineer reading great literature, listening to great music or admiring great art. . . . That's rather sad."

Keep up the great image, Marshall Kaplan! It's what *your* education *trained* you for . . . not what mine is *preparing* me for.

—Gary Davis, '78

Coombsie recalled . . .

Editor: As one of the two hundred odd men who first came in contact with "Coombsie" in the fall of 1911 I greatly enjoyed the fine article by Carl A. Keyser '39 which appeared in the December JOURNAL. This article brought back many treasured memories of this stalwart person. Probably never in the history of WPI has any one member of the faculty made greater impact on the minds and hearts of Tech men than Zelotes W. Coombs. His manners were sometimes brusque but never unkind. They were invariably intermingled with a ready and infectious smile.

Well remembered are his lectures and classes. He used to remark periodically, "I am pleased to report that the freshman themes are coming in with commendable regularity." One of these themes which was required writing for the freshman course was the perennial *"Who I Am and Why I Came to the Institute."* Also recalled is the mannerism, which many will remember, which "Coombsie" had in moments of thought or meditation of placing the index finger of one hand alongside his nose in a characteristic personal posture.

"Coombsie" was adopted by the Class of 1915 as an honorary class member and for many years the class emblem was his famous umbrella. This umbrella figured prominently in an abortive class "rush" which occured on the front steps of Boynton Hall. The freshman class (1915) had just completed its first class meeting in Boynton Hall under the friendly auspices of the junior class. It so happened that the sophomores had, several days earlier, issued rules for the freshmen, one of which prohibited the use by them of the front door of Boynton Hall. Emboldened by the success of their organizational meeting just held, several freshmen decided to turn up the cuffs of their trousers (another violation) and boldly go out the front door. They were met by a determined group of sophomores and a vigorous scuffle ensued. (Class rushes had been forbidden by the faculty due to a serious accident the previous year.) As the fray was continuing with no sign of abatement a stalwart, energetic figure appeared on the scene. It was Professor Zelotes W. Coombs! Without hesitation he waded into the center of the melee, whacking heads right and left with his umbrella and demanding a cessation of hostilities. The rush speedily ceased.

The above incident occured on the morning of September 29, 1911, and my diary of sixty-three years ago has the following terse entry; "Chemistry lecture. The juniors organized the freshman class with Hayes, president, Brown, vice-president. I was nominated for secretary but the meeting was adjourned until Tuesday. Some of us turned our pants up. Rush on the front steps of Boynton Hall. Coombs dispelled it with umbrella."

M. G. Steele '15
Rome, N.Y.

. . . and the real Asnabumskit Hill

Editor: in reference to Carl A. Keyser's article on "Coombsie" (WPI JOURNAL, December '74), Asnabumskit Hill is very real, being located in Paxton less than 10 miles from WPI.

Even today, *despite* "the exhaust of a thousand cars," a WPI freshman can still capture "the color of Fall, leaves crunching underfoot, and the smell of the woods" by hiking up Asnabumskit (elevation 1,395 feet). At the summit, which is somewhat marred by the Channel 14 TV station and a telephone company relay station, he can dally to enjoy the views (toward Boston At Prudential Rock or to look out over the reservoirs to the west), picnic, or pick some of the many blueberries that proliferate there in the summer.

While I never met Coombsie, his only failing seems to have been not to provide a road map to accompany the reading of the Asnabumskit essay. With sufficient advance notice I will gladly provide a guided tour for any of your interested readers.

Ladislav H. Berka
Associate Professor of Chemistry, WPI

Nuclear flak from Viet Nam . . .

Editor: As a "nuclear reactor critic," I read with interest Dr. Rasmussen's "Nuclear reactors – safe or not?"

His comparison of the worst-case nuclear accident with a commercial airline crash into the Rose Bowl on New Year's Day is an oversimplification of early AEC reports that a single nuclear accident could well result in 45,000 fatalities, $200 million in property damage, and contamination of an area the size of the state of Pennsylvania. Of course the people who compiled these figures are more than likely no longer in the employ of the AEC.

As to the chances of such a catastrophe occurring, let us assume if in the year 2000 that 1,000 nuclear reactors will be operational as predicted by the AEC. If the probability of a major accident were in fact one-in-a-million per reactor-year, there would be one chance in 33 that such an accident would occur during the 30-year lifespan of the reactors. And this with Dr. Rasmussen admitting, we can't with our present limited experience even claim the one-in-a-million chance of a serious accident.

But the proof is in pudding. The Price-Anderson Act which was recently renewed is the only form of insurance available to the victims of these "one-in-a-million" accidents. Liability per accident is limited to $560 million, inadequate according to the AEC's own findings. And of this amount, we, the taxpayers, will assume 80% of the risk, with the utility companies accepting the remaining 20% ($112 million). No insurance company or group of insurance companies in the world is prepared to accept the consequences of a nuclear accident. If you don't believe it, read the fine print in your homeowner's insurance policy.

I will wholeheartedly agree with Dr. Rasmussen that sufficient oil will not be available to meet our increasing power needs. And I will admit that the burning of coal does not come without its problems. But I will not conclude, as Dr. Rasmussen does, that America should expend additional efforts in the expansion of an industry which will certainly prove to be opposed to the long-term interests of the world and its people.

Peter Baker, '64
Saigon, RVN

. . . and New Zealand

Editor: My October JOURNAL arrived last week marked all over by the Post Office "please notify sender of your correct address." I scanned the Journal and sent the Alumni Office a note asking them to change my addressograph plate and also included a short blast on your nuclear energy articles based only on the scan. Since then, I have read the articles carefully and was much disturbed by the deception, half-truths, and distortion-of-fact which they contain. The fact that my alma mater published these data without comment is of deep concern to me. I have prepared a commentary on these articles which I hope you see fit to publish.

As you know little about me, a brief resume: My BS was in ME/AE, class of '37. My MS in ME was earned at the University of Washington in '51, and I hold a Professional Aeronautical Engineers license, State of Ohio. Most of my professional life was in AE although three to four years was in ME dealing largely with thermal power generation. I was also an instructor at the University of Washington, College of Engineering, and taught in the public school system in the State of Washington. I took my retirement early in lieu of going to California. Although "retired," I am now operating a 500+ acre sheep and cattle farm pretty much by myself. It was not until I came out here some years ago that I realized how distorted the American sense of values has become.

I realize that the commentary which follows is highly critical of people and organizations in high places, but to the best of my knowledge it *is* factual. It is possible in your society that if enough concerned "little nobodies" raise their voice in protest, changes can be brought about – you at least dumped Mr. Nixon! The issues I raise, though, make Mr. Nixon look like a two-bit hit man by comparison.

The October '74 JOURNAL ran three articles on the application of nuclear energy to electric power generation. In his forward, Mr. Kay indicated these articles and two in a preceding issue were essentially transcripts of guest lectures and (hopefully) implied that they did not necessarily represent a WPI position on the subject. Because they were published, I feel they should not be left standing without comment. Not only do they paint a most peculiar picture of a rather important subject, but they also reflect a malignancy in American society which has reached alarming proportions since World War II.

I no longer have the Teller and Glazer articles so cannot comment specifically on their content. I am aware though of Dr. Teller's reputation of being a relatively competent physicist, a proponent of nuclear power, a forceful mouthpiece for the "power elite" – but morally destitute. My recollections of his article fit that pattern. Doctors Goldman's and Rasmussen's articles fit a similar pattern, but whether or not they are technically competent I don't know.

One of the things WPI used to teach when I was a student there is that, when safety is involved, you design for the worst known condition and add a safety factor. Based on my professional experience, this is sound teaching as it tends to compensate for Murphy's laws. (In case seome are not yet familiar with them, they state: (1) If it can be put together backwards, some knucklehead will find a way to do it. (2) If it can fail, it will, and (3) If it fails, it will do so at the worst possible point in time and space.) In his discussion, Dr. Goldman indicates two limiting design criteria for nuclear reactors and pooh-pooh's them as being ridiculous. This stance should raise serious question as to his competence to design or evaluate much of anything.

Both Goldman and Rasmussen are a bit glib with their statistics. For instance, Dr. Goldman's use of 200 million population as a base for his man-rem dosage by a particular reactor. It makes the numbers come out nice and small, but is it likely that the entire U.S. population will be congregated in the

area of that particular reactor? Dr. Rasmussen in his attempt to justify no safety provisions for pressure vessels, collects reams of statistics on conventional steam plants; and as they show a low failure rate, he concludes the nuclear vessel will follow the same pattern. He does point out that the nuclear vessel is operating up to 2000 psi but doesn't mention that very few steam plants (which he's using as a basis of comparison) operate over 200-300 psi. This marked difference in operating environment renders his statistical base meaningless.

It is also interesting to note that the maximum man-rem dosage quoted by Dr. Goldman as being an "absolute" value is actually only the present (and rather arbitrary) limit set by the AEC. If you look back carefully into limits set by the AEC from about 1945 on, you will note that as knowledge increases with time, the limit decreases. The facts of the matter are that nobody really *knows* what these limits are, and the limits set are but the present "best-guess" available. For Dr. Goldman to take these arbitrary limits as absolute, dilute them with falsified statistics and then pooh-pooh the results borders on treason to the human race. Remember the old adage, "Figures don't lie, but liars sure as hell figure!"

Mr. Cherry presented some rather interesting "weaknesses" of the organizations established to control the application of nuclear energy in the U.S. It would have been a fine article had he stopped at that, but he evidently felt duty-bound to make some suggestions for improvement. These suggestions laid a big fat egg and made one wonder how much faith he could put in what had been said previously. Possibly, Mr. Cherry has not yet come to realize that decency cannot be achieved by legislation.

It is interesting to note that since the "energy crisis" surfaced and your government has budgeted billions of dollars to cope with it – the vast majority of that government money is being channeled into areas controlled by the oil cartels. The Alaska pipeline (condemned by environmentalists), oil from coal, nuclear reactors, you name it, are all adequately endowed, while abundant non-polluting energy sources which are not controlled by the oil cartels – such as geothermal, wind, tide, and solar – are handed only a pittance to make the record "look good." Also consider the fact that, although, given very little publicity, it was to protect the oil cartel's interest in the off-shore oil that the U.S. became embroiled in the Viet Nam war.

My coming to New Zealand has made me realize how markedly disadvantaged you in the states really are. I think it can truthfully be said that your governmental machinery – based on the Declaration of Independence, the Constitution, and the Bill of Rights – is better than anything else now existing in the world. Your experience with it since WWII should graphically illustrate that no matter how good the "system" may be, it can always be corrupted by greedy men. Although our "system" may leave something to be desired, and our politicians and Government Servants may not be geniuses, they at least are honest and truthful. It *does* make a difference!

In my opening paragraph, I mentioned a malignancy which has crept into American society, particularly since WWII. I had reference to the changes which have occurred in your capitalistic system. Capitalism, basically, is a system for managing money, and as practiced there up to as late as the 30's, had much to commend it. Since WWII though, your capitalism has become almost a religion with "money" its deity. Money *is* a real god, and very powerful. It is also very harsh, cruel, and heartless. Presently the American oil cartels not only control oil, but also gas, coal, nuclear energy, etc. With much of the world's money now gravitating to the oil cartels (and to the Syndicate?) the picture presented is not exactly rosy. How (or if) this social cancer can be controlled remains to be seen.

Hopefully, other alumni who may be in a position to effect some change will take heart from this message and be moved to actually do something about it.

Frank Rollins
Richmond, Nelson, New Zealand

by Stephen Raczynski,
Sports Information Director

"Poor Jim Gorman"

The 142-pound weight class in New England college wrestling has traditionally been a tough league for many years. In fact, it has become almost legendary.

And that's why for days before the season began last December, WPI wrestling Coach Phil Grebinar could be heard singing the refrain, "Poor Jim Gorman." It seems that Jim Gorman wrestles in the 142-pound class. At season's end, though, "Poor Jim Gorman" had startled everyone except his coach by posting a hard-earned 13-2-1 record.

The wrestling team's overall record this year was 7-9, but you can't pin the losing season on the team's six first-year students. Five of the six top scorers were in their first year at WPI, led by Springfield's Mike Beaudoin (126 pounds), who was a two-time New England high school champion; Kevin Northridge (134 pounds) of Florham Park, N.J.; Bill Diederich (158 pounds) from Hartford, Ct.; and Bryce Granger (150 pounds) of Kensington, Md.

But it was Jim Gorman who led the team in wins (13), three-point decisions (7), four-point decisions (2), and who finished second behind Beaudoin in average points scored per contest (3.4). It was only Jim Gorman who placed in his competition (finishing fifth) at the New Englands held at Massachusetts Maritime Academy at Buzzards Bay last February. It was Jim Gorman who was

several times named a game captain by his teammates prior to meets. And it will be Jim Gorman, a sophomore next year, who has been elected to co-captain the team. A rare honor for a first-year student in any collegiate sport.

Coach Grebinar is not surprised. "He is a fiery and outgoing type, and even though he is only a first-year student his gutsy attitude has made him a team leader. He seems to have a mean streak as a wrestler, and he wasn't pushed around by the more experienced men he faced this past winter."

It is no coincidence that Jim came to WPI. His ties with Coach Grebinar go way back. "I had Jim as a sixth-grader," recalled Grebinar, "when I was practice teaching at Windsor (N.Y.) Central School to fulfill my degree requirements at Cortland State. I remember Gorman as a fine athlete even then, one of the best in the school."

"We recruited him for his ability as both a wrestler and a football player," said Grebinar, who is also the defensive line coach in the fall. "In fact, Jim's football coach at Windsor Central, Tom Cordes, was my roommate in college for two years. But Jim has a definite nose for hitting, and that is why he has been our 'monster back' on defense."

This year was a losing season, but next year looks a lot brighter. And in retrospect, it was "Poor Jim Gorman" who made all of New England's other legendary 142-pounders look all the poorer.

Winter Sports Notes

Only the **swimmers** came through with a winning record during the winter months at WPI, finishing their season with a 7-6 slate. The year was capped with record-shattering performances by several mermen in the final exciting meet against U.R.I. First-year student Bob Brown broke three records while his classmate Steve Custance and seniors Rick Aseltine and Leo Letendre broke one each. Three of WPI's wins came at the expense of Holy Cross, Assumption, and Nichols; thus the Engineers became Worcester County champions. The season could have marked the finale for Coach Carl Peterson, whose teams have won 40 of 68 meets during his seven years as swim coach at WPI.

Basketball Coach Jim Herrion was riding high with three opening wins in December, but fourteen consecutive losses for a final 5-16 record considerably dampened the season. Senior co-captain Jim Aceto, who averaged 11.7 points a game was named the team's most valuable player by the Worcester Area Coaches, Sportswriters, and Sportscasters Association.

WPI sophomore Brian Huff of Canada was awarded first place in the overall New England collegiate **Skiing** Competition held throughout January, February, and early March at various snow-capped peaks in Vermont, New Hampshire, and Massachusetts.... The WPI-Assumption **basketball** series has ended with Assumption winning 22 of 37 encounters.... The **Hockey** Club ended the winter at 5-6-2 under Coach Len Bowen.... Merl Norcross's varsity **indoor track** team finished at 2-3; pole vaulter Gary Pearson, high jumper James Howe, and long jumper Paul Varadian all did well.... WPI's successful **soccer** team came out of retirement in the off-season to win the First Annual Boston University Indoor Soccer Championship. In perhaps an even greater feat, the team wound up fourth (of 24 teams) in the Fifth Annual University of Connecticut Indoor Soccer Tournament, the largest and most prestigious tourney of its kind in the country. John Maxouris scored 18 goals and Alan King, Jr., counted 7 to lead the team.

WPI's **Harrington Auditorium** was once again the site of all the Central Massachusetts High School District basketball playoffs, as well as the Division II state championship and the women's state championship.... WPI's national championship **bowling** team (actually a club sport) is once again in first place in the Tri-State Conference and have won several tournaments during their long season. Captain Ed Karedes and Jack Germaine continue to knock down the tenpins in their quest to retain their national title at Dayton, Ohio, in early May.

WORCESTER POLYTECHNIC INSTITUTE ALUMNI ASSOCIATION

The Air Travel Service of Transamerica Corporation
Trans International Airlines

BERLIN Option

VIENNA Option

PRESENTS

Munich

SALZBURG Option

GARMISH ALPS Option

DEPARTURE DATE:
AUGUST 8, 1975

DEPARTURE CITY:
BOSTON

$399*

8 days, 7 nights

*Plus 15% tax and services (based upon double occupancy). Single supplement: $70.00 additional.

INCLUDED FEATURES:

- Round trip jet transportation via Trans International Airlines with complimentary cocktails and deluxe inflight dining.
- All flight reservations and tickets.
- Pre-registration at your hotel.
- Deluxe hotel accommodations at the magnificent Munich Sheraton for 7 nights.
- All transfers between airport and hotel.
- All baggage handling—no tipping necessary.
- Gala Bavarian Beerfest.
- Half-day sightseeing tour of the highlights of Munich.
- A Trans National Travel tour escort throughout your vacation.
- A Trans National Travel hospitality desk in your hotel.

Limited space available on a first-come, first-served basis.

Mail checks and reservation to:
Stephen J. Hebert—Alumni Office
Worcester Polytechnic Institute
Worcester, MA 01609

DEPARTURE DATE:	DEPARTURE CITY:	PRICE
August 8, 1975	Boston	$399. + 15% (59.85) - $458.85

☐ I would like to go to MUNICH. Please bill me for my deposit. ($100. per person)
☐ Please charge my deposit of $_____($100. per person) to MASTER CHARGE
Acc't #_____ Valid Thru_____ Signature_____

ENCLOSED is my: ☐ full payment of $_____ ☐ deposit of $_____ ($100 per person)

I am reserving _____ (number of seats). I understand that final payment is due 60 days before the departure.

MAKE CHECKS PAYABLE TO: Worcester Polytechnic Institute

PLEASE PRINT and if more than one couple, attach a separate list with complete information as below.

FULL NAME_____ TEL # office_____ home_____

STREET_____

CITY_____ STATE_____ ZIP_____

☐ I want "Dine-Around" option. Add $45.00 to my final payment.

☐ SINGLE OCCUPANCY ($70.00 additional) If sharing a room with another person, _____
☐ SMOKING ☐ NON-SMOKING section of the plane. (name of roommate)

☐ PLEASE SEND ME ADDITIONAL INFORMATION

For additional information call: 617/753-1411-Alumni Office
617/965-3900-Margie Minter

A private university in a public world

by Russell Kay

YOU PROBABLY TAKE FOR GRANTED the fact that Worcester Polytechnic Institute is a **private** university. But what does it **mean** today to be a private institution in a state whose public higher education system is growing quickly? And what does it mean to have to finance your own way in a depressed economy, competing with public institutions whose tuition is just one-tenth your own?

The relationships between WPI and the other eighty-seven private institutions in Massachusetts, and the thirty-two publicly supported schools, form a complex maze of competition and cooperation. The nature of that maze is the subject of this article.

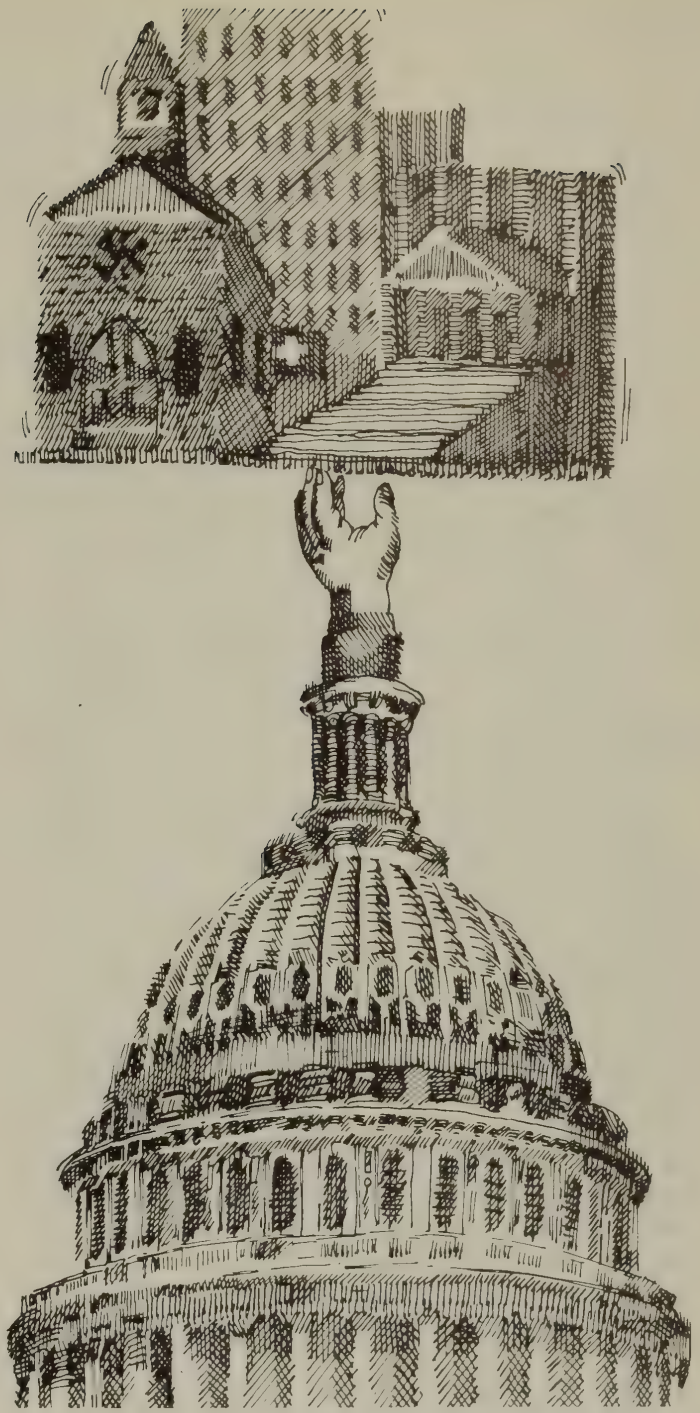
Who's who and how much in Massachusetts

The preponderance of private institutions in Massachusetts is striking. Nationally, about three-fourths of all colleges and universities are private, but they enroll only about one-fourth of the total number of students. Massachusetts is the only state in the nation where more than half of the enrolled students attend private institutions; in fact, 144,000 (or 58 percent) of the state's 250,000 undergraduates are in private colleges. Massachusetts' privately supported colleges and universities in 1974 awarded 75 percent of all bachelor's degrees, 85 percent of all master's degrees, and 95 percent of all doctorates in the state. An interesting statistic is that one out of every ten students in the nation applying to college for the first time this year applied to one or more of the private schools in Massachusetts.

Public higher education in the Bay State got off to a slow start as compared to other parts of the country. The large number of private institutions was undoubtedly an important factor in that slow start. But as population and demand grew, the state's public higher education system grew too. In 1959-60, the legislature appropriated $18 million, or about 4 percent of the total budget, for all of higher education. For 1973-74, the figure proposed was $213 million, or 9 percent. Still, Massachusetts has lagged far behind the rest of the nation. In 1973 it ranked 34th in the country in terms of per student appropriation, and 49th in per capita expenditures for higher education.

Enrollment— Where do the students come from and more importantly, where do they go?

The lifeblood, the *raison d'être*, of WPI and all other educational institutions is the education of students. WPI and the other institutions, whether public or private, each need a certain number of students to be able to operate efficiently, and in some cases to be able to operate at all. But while the total



educational capacity has been expanding, the total available pool of students has been decreasing.

The peak year for having babies in Massachusetts was 1957, when 115,000 were born. Now in 1975 that bumper crop is turning 18 and thinking of college. So right now things aren't bad. But in 1973, by contrast, only 74,000 births were recorded, which means that for the next twenty years or so the number of students entering college from Massachusetts will decline at a significant rate.

Unfortunately, that's not the only decline to worry about. In 1969 about 53 percent of all high school graduates in Massachusetts went on to college. At that time many educators were forecasting that this rate would increase by 1 percent a year for the next two decades. What has happened, though, is a *decline* of over 1 percent a year, to the 1973 figure of 45 percent.

For the past few years, nationwide enrollments have been dropping. In the wake of the 1970 recession and the cutbacks in aerospace programs, engineering enrollments plunged to an unrealistically low figure, as students apparently looked at the number of engineers out of work and decided that it just wasn't the field to enter. That trend had nicely reversed itself when the oil crisis and the current recession hit hard, and now everyone has trouble finding a job. At the moment the picture is mixed. Some institutions report a record number of applications for engineering study, while others are down significantly. At WPI, admissions director John Brandon reports that the number of applications is running 8 to 10 percent ahead of 1974.

Get a job

The fashionable thing in education circles these days is to be "career centered." Which means, basically, Can I get a job easily after graduation (or maybe even before)? In one sense it is the "relevance" of the late sixties and early seventies updated to face a badly depressed job market. Students who might have majored in such fields as Black studies or philosophy a few years ago, for example, now find themselves enrolling in programs like accounting.

One aspect of this shift has been a strong persuasion by governmental agencies to direct much of the available aid to higher education into these "goal-oriented" (another popular term) programs.

One of the primary reasons for this change in public attitude, the economy aside, is disillusionment with some of the muzzy programs that proliferated in higher education in the boom years of the sixties. Carl Gilbert, president of the Association of Independent Colleges and Universities in Massachusetts (AICUM), puts it this way:

"Colleges and universities continued to behave as if everything would turn out for the best in the best of all possible worlds. Coupled with the this blithe attitude was a profound conviction that the colleges and universities of this country

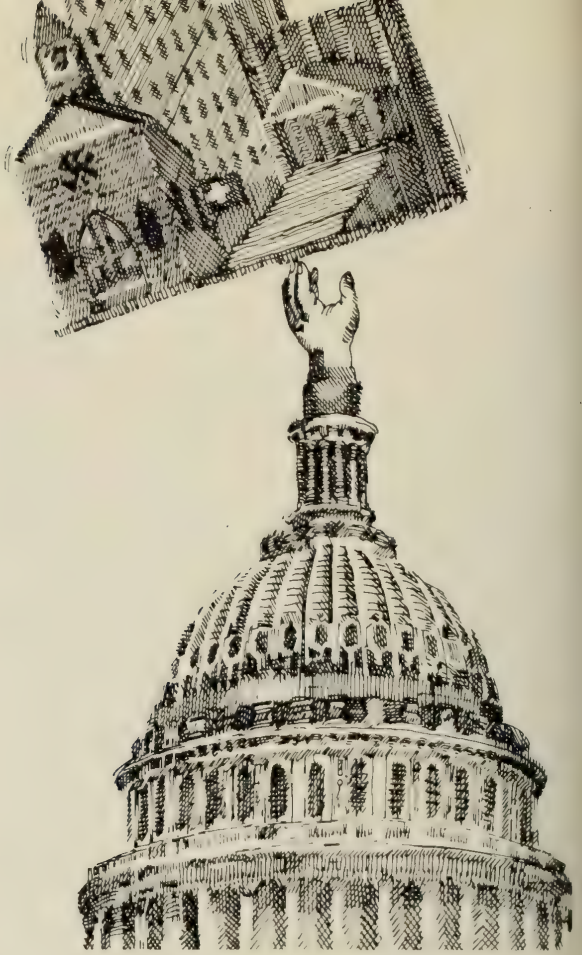
were capable of solving *all* of society's problems, or righting all of the country's wrongs, and of designing a bright and shiny new world in which there would be no shortcomings. Intellectual arrogance of this sort is perversely attractive to those who crave simple solutions to complex questions, and the country was quick to accept this self-anointed leadership and to respond with grants, esteem, and more problems. Neither the grants nor the esteem, however, were proportionate to the magnitude of the problems.

"Higher education's role as social messiah was brief, unconvincing, and in some ways embarrasing, largely because it could not deliver on many of its promises, glibly given and unquestioningly accepted. A disenchanted public and Congress realigned priorities within education to the detriment of higher education, and then pushed all of education to one side to allow other social demands—energy, ecology, and the elderly, to name a few—to come to the head of the line."

WPI finds itself in a curious position with regard to this job orientation. WPI has traditionally been oriented toward practical education (*Lehr und Kunst,* and all that). The redirection of emphasis with the WPI Plan, putting stronger emphasis on interdisciplinary programs, on individual needs, and on viewing engineering and science in their social contexts, is now being recognized as producing graduates who are noticeably more able to step into jobs in business and industry. J. S. S. Ribeiro, '58, of Jamesbury Corporation in Worcester, feels that WPI Plan graduates "are coming out just as good engineers as our older grads, but they are much more aware of the society in which they are doing engineering."

A recruiter for a federal agency, himself a WPI graduate, wrote: "I was very impressed with the quality of students this year. My last visit was three years ago when the Plan was in its infancy—what a difference now! The exposure to real world problems is putting your students far ahead of those from other colleges in coping with real-life situations. They are much more conversant, self-assured, and accustomed to solving problems for which the answers are yet unknown."

And in one of the most telling endorsements from industry of the WPI Plan, Westinghouse this year made seven job offers to 1975 graduates. The four Plan students were all offered higher starting salaries than the non-Plan students, *because of their project experience.*



Who pays for college? And how much?

The first answer to that question is, of course, the student—or, more usually, his parents. Tuition plus room and board plus fees plus books plus living expenses plus spending money plus travel . . . less any financial aid. It's a big bill these days, and it's certainly one reason for the growth of low-tuition, close-to-home public institutions. The 1974-75 tuition at WPI was $2,900. (Next year it will be $3,150.) The 1974-75 tuition at the University of Massachusetts was $300. Since it does not cost the state appreciably less to educate students than it costs WPI, the $2,600 difference in tuition represents a direct subsidy, a scholarship paid for by the taxpayers and given to any student who chooses UMass, regardless of whether he can afford to pay the real costs of his education.

But in any case, tuition doesn't cover the whole bill at a school like WPI. Education in science and engineering requires heavy investment in equipment, and the project aspects of the WPI Plan require that extensive technical resources be available to students. Compare this with, for example, the study of philosophy, where you can get by with a bench, putting the teacher at one end and the student at the other.

The one-third of costs not covered by tuition must be made up from endowment and from private and public gifts. These sources have been shrinking noticeably. Fund-raising at some

institutions is off 30 percent this year compared to last. Foundation money is harder to find, as portfolios have shrunk in value and priorities have been changed. The Ford Foundation is one example. In 1960 they distributed $140 million (of a $360 million total) to higher education. In 1978 they plan to distribute about $15 million (of $100 million total), and most of that is committed to minority education.

Federal aid has been a big factor in the recent expansion of private institutional programs. But federal programs have a way of disappearing as Congress and the agencies involved become interested in new projects, and often an institution is left with commitments to students and to a program that requires outside funding; when this funding is not available, the commitments then cut into the institution's general unrestricted resources, helping to build deficits, create budgeting nightmares, and ultimately limit the options available to students.

Federal student aid programs are limited at present and likely to remain so. A report of a task force of the National Council of Independent Colleges and Universities, *A National Policy for Private Higher Education*, concludes that "federal programs of student aid are not well suited to the needs of private institutions and their students. The programs do not provide realistic amounts of money to help students meet the costs of attending private colleges and universities. The conditions are often too restrictive or the programs are underfunded."

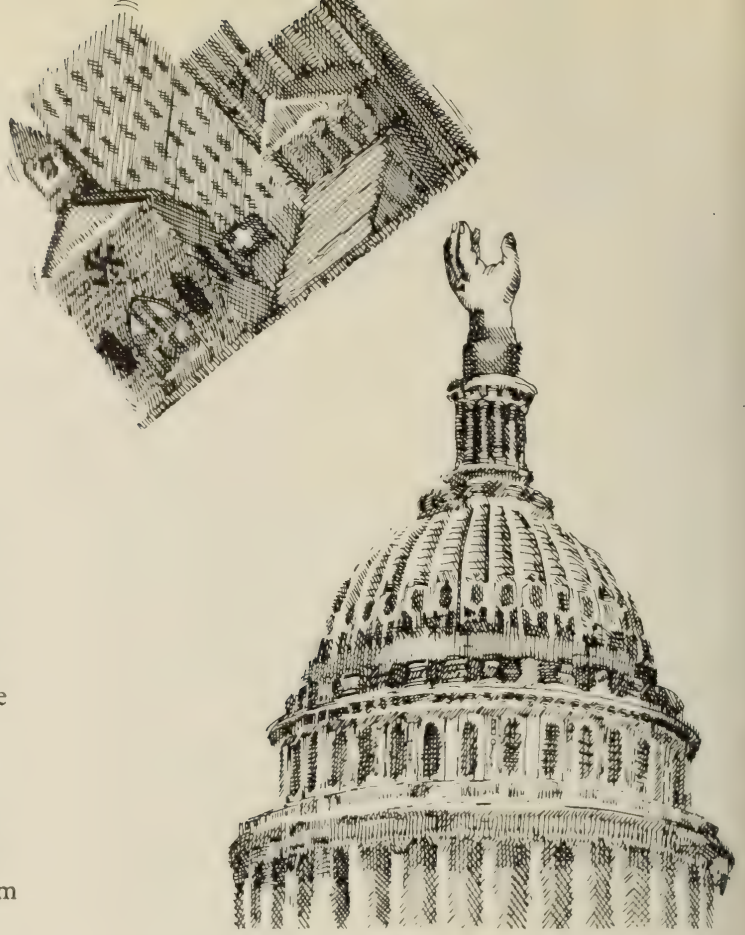
State aid to narrow the tuition gap is a touchy subject. Massachusets does have a state scholarship program. It currently provides about $10.5 million a year—three times what it was a couple of years ago, and less than one-third of what many consider the actual need. What increases there have been have resulted only from legislative activity; Massachusetts' governors have not yet seen fit to take action in this area. Until last November, there was a constitutional ban against providing state aid directly to private colleges and universities. (Indirect approaches, such as contracting with individual institutions to provide needed educational programs that the state could not supply itself, such as physical therapy training, have been very small in scope.) That ban was lifted by constitutional amendment in the last election, but whether anything more will be done to aid Bay State students remains to be seen.

Cooperation as well as competition—the Public/Private Forum

With all the differing goals and differing resources of the public and private institutions which are competing for the same students, there has been a very significant and heartening degree of cooperation between the two in Massachusetts in recent years. On the broadest scale there is the Public/Private Forum, a regular series of meetings since 1973 in which educational leaders from both sectors have come together to discuss problems of common concern and to develop courses of action for defining and sometimes solving these problems. Frank A. Tredinnick, Jr., executive vice president of AICUM, calls the Public/Private Forum "a serious effort to begin to view all of higher education in Massachusetts as a single entity for purposes of planning, rather than as two different, unrelated groups of institutions."

The Forum first went to work on developing a proposal for an improved program of state scholarship aid, reaching a compromise where both public and private institutions agree that 70 percent of increased scholarship funds would go to students in private colleges and universities. The future of this program, of course, is in the hands of the state legislature. In another early action, the Forum took the legislature by surprise when it spoke out against the traditional practice of making legislative decisions regarding capital outlay for public higher education on the basis of noneducational considerations (e.g., the construction lobby needs so many millions of dollars of projects from the state).

In addition to these, the Forum has also produced agreement on the need for a statewide "open planning" process aimed at avoiding needless duplication of programs and facilities. It is working toward providing more comprehensive and more accurate data to the Board of Higher Education to facilitate planning on all levels by all institutions. And it is renewing efforts to expand consortia and other resource-sharing arrangements.



The Worcester Consortium

One of the major demonstrations of public and private institutions working together and sharing resources is right here in town, the Worcester Consortium for Higher Education. Established in 1967, the Consortium has pioneered in a number of areas. Students from any member institution can take classes at other member institutions with no extra fees. Thus a WPI student can take a film course at Worcester State College, a psychology course at Clark University, language courses at Holy Cross College, and so forth. And students from Quinsigamond Community College and Worcester State, both public institutions with much lower tuition than the private colleges, can take courses at WPI and Clark and Holy Cross and Assumption. This cross-registration program is handled with no extra charges to either students or institutions. Another area of educational cooperation is in the formation of joint programs. One is a "health care option," in which students can select from about fifty courses at various member institutions; taken together these form a cohesive introduction to health care and its career options from a number of different viewpoints.

In another area, the graduate department of management at Clark University was contracted by Worcester State to establish an undergraduate program in administrative studies, including business, public, and health-care administration. Now in its second year of operation, the administrative studies program is the second largest major at Worcester State, with 600 students enrolled.

Finally, there is the Consortium Scholarship Program, an imaginative approach to providing state aid to students at private colleges. Students who are Massachusetts residents enrolled at a Consortium private institution in a major or program which is not available at Quinsigamond or Worcester State, and who can demonstrate financial need, are eligible for publicly funded scholarships of $750. In its first three years of operation, ending this spring, the program will have provided nearly $450,000 to the eight private Consortium members.

Somewhat outside the Consortium proper, WPI has just adopted a new joint degree program, the PhD in biomedical sciences, in conjunction with Clark and the Worcester Foundation for Experimental Biology. Due to begin in September, the program will use laboratory space at the University of Massachusetts Medical School for its first year and a half while WPI's Salisbury Laboratories is being remodeled.

Where's it all going to end . . . ?

The interaction between public and private higher education, both statewide and locally, is inevitably going to increase. Both types of institutions are necessary to provide a healthy diversity and a realistically wide range of educational options for students. Private colleges and universities are not educational luxuries, as some people would have it. Neither are they intrinsically superior to public institutions, as others would maintain. The two sectors depend on each other; they support and complement each other's strengths. They serve as examples to each other of alternative ways of doing things, offering different philosophies, environments, and often serving different types of students.

So the next time you hear something on the evening news broadcast about public higher education, don't think that it won't affect private colleges—or that it won't affect WPI. The destinies of the two are interlocked.

This article was developed primarily from a statewide series of seminars for college and university trustees given by the Association of Independent Colleges and Universities in Massachusetts in October 1974. The WPI JOURNAL *is indebted to the* AICUM *staff, particularly Robert M. Hyde, vice president for public affairs, for help in preparing this report.*

The data on which these class notes are based had all been received by the Alumni Association before March 3, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI JOURNAL.

1908

Donald D. Simonds, class secretary, reports the death of his son, Dr. Sheborne B. Simonds, on March 8, 1975 at Monterey Park, Calif.

1910

As usual, a hurrah for 1910 and the new year from **Oliver Jacobs,** who writes that he hopes to "greet some 1910 boys in June." . . . Also looking towards June is **Carlyle Atherton,** who hopes to attend the reunion although he cannot without the help of a walker. . . . **Millard Clement** and his wife, Marietta, feel that getting to WPI for the reunion might be quite a job. Millard says that things are getting to the point where he even "forgets what I forgot and when I forgot it." . . . **Ralph Gold** and his wife, Helen, have refurnished their dining room to make a hospital room at their home in Middletown, R.I. Both recently suffered strokes and have a fine staff of three nurses who look after them 24 hours a day. Receiving friends and letters have helped to make their confinement pleasanter.

Alvan Grout has moved back to his former residence in Largo, Florida and wants to make the 65th. . . . **Edward** and Tex **Hanff** are doing quite well. Ed, who recently celebrated his 85th birthday is now the class "baby" since **Fred Hewes,** the class president, passed away last year . . . **Leonard Howell** now lives with his daughter at Foxwood Dr., Eastham, Mass. . . . Class Secretary **Charles E. Barney** says of **George Martin's** recent move to Ashburnham, Mass., "Wouldn't it be cheaper, Hap, to pay up the back rent?" Hap, who is recovering from a recent operation, has his wife, Anna Mae, three children, eleven grandchildren, and seven great grandchildren all pulling for him. He enjoys letters (152 Sherbert Rd., Asburnham, MA 01430). . . .

Irving Peters broke his right hip in November and is now having therapy, according to his wife, Clara. Last July he suffered a stroke and now his right arm and hand are quite useless. He is trying very hard to get well again. . . . **Paul** and Marion **Twiss** went through a trying year, but now are doing better. Marion had cataract operations on both eyes. After a year of blindness she is now thankful that she can see. While she was ill Paul had to do the house work and yard work. He reports that the yard work got out of hand because things grow so fast in Florida. . . . Class Secretary **Charles Barney** and Mildred write that they are hibernating at 53 Bardwell Street for the winter. They celebrated their seventh happy year together on November 18th. Both of the Barneys are well "except for seeing, hearing, and remembering." Charles had a medical checkup in January and received A + in everything. He reports that Mrs. Kubic, who came to 53 Bardwell St. for a two-week stint in 1963 is still with them as housekeeper, chauffeur, nurse, friend, and boss. He doesn't think that he and Mildred will be able to attend the reunion.

1927

Cecil R. Furminger has been named the state director of the American Association of Retired Persons in Wisconsin. Previously he was active in state and national affairs of the AARP.

1931

Albert I. Palm retired last August after 14 years as a sales engineer for A. P. deSanno and Son, Inc., (abrasive manufacturer) in Phoenixville, Pa. Also a specialist in steel mill applications, he had previously served in the same capacity at Norton Company, Worcester, from 1944 until 1960. Earlier he was associated with Stidsen and Palm Company, U.S. Steel Corp., and Worcester Gas Light Co. Mr. Palm, who now resides in La Puente, Calif., writes: "perfect weather. Living on a hilltop overlooking the San Gabriel Valley. Paradise!"

1932

Dana B. Carleton, former general superintendent of U.S. Steel Corp., New Haven, Conn., has retired. . . . **William H. Hinchcliffe** has retired from Jones & Lamson Machine Co., New York City, where he had been district manager. . . . **Olof W. Nyquist** retired in February after 42 years of service with General Electric Co., Conneaut, Ohio. The Nyquists now reside in Orleans on Cape Cod. . . . **Eugene W. Somerville,** who served as a vice president at United Illuminating Co., New Haven, Conn., for many years, retired last July. . . . Also retired is **Edwin C. Tucker,** who was a research engineer at Norton Co., Worcester.

1933

Vincent F. Buell retired last November. He had been chief structural engineer at Stubbs, Overbeck & Associates, Houston, Texas.

1935

C. Marshall Dann, commissioner of the newly renamed Patent and Trademark Office, was highlighted in the January issue of *Chemical Week*. After a year on the job, one employee says of him, "He's the ninth commissioner I've worked with, and when it comes to management, he's the best." Dann was with DuPont from 1935 until 1974.

1936

Leonard W. Johnson, former vice president, board member, and manager of the commercial division of the Bailey Co., Inc., Amesbury, Mass. retired recently.

1937

Harris W. Howland, an application engineer at General Electric Co., Detroit, Mich., retired on January 31, 1975. Currently he is located in St. Petersburg, Florida.

1938

Prof. **Donald W. Howe** of the WPI physics department has been elected to the board of directors of Region I of the University Professors for Academic Order. . . . **Robert L. Somerville** is president of the newly-formed company, Landskrona International, Incorporated, in Neshanic, N.J. The firm will market the Landskrona travelling belt filter —wet process phosphoric acid filtration equipment for the chemical, fertilizer, mining, paper, and pulp industries.

1939

John M. Driscoll has been elected a director of Stone & Webster Engineering Corp., Boston. Associated with the firm since 1970, Driscoll is a senior vice president and manager of the process industries group. He is a member of AICE and ASME. In 1972 he received the ASME "man of the year" award. . . . **William J. Sexton, Jr.** is with A. J. Kelley Transportation, Torrington, Connecticut.

1941

F. Douglas McKeown is a technical science advisor to the Massachusetts Law Enforcement Division, Mass. Committee of Criminal Justice, Boston.

1942

Raymond H. Matthews is manager of engineering and quality control at Tempstat Corp., Hinsdale, N.H.

1943

Robert W. Alexander serves as production manager at Beckwith Laminar Corp., North Reading, Mass.

1944

Roy E. Baharian has been appointed a group vice president of Diamond International Corporation and will be in charge of the firm's engineering, procurement, and traffic operations. Baharian, who will be headquartered in New York City, joined Diamond in 1956 as a project engineer. Later he was assistant director of manufacturing for the Diamond Match Division; manager-engineering services for the Match and Woodenware Division; and chief engineer for research and engineering of the company. In 1972 he was elected a corporate vice president of Diamond International in charge of engineering and procurement.

Prof. **Joseph S. Marcus,** associate dean of engineering and professor of civil engineering at the University of Massachusetts, was a recent guest speaker at a B'nai B'rith breakfast meeting held at the Jewish Community Center in Worcester. Last year he spent his sabbatical leave at Technion, Haifa, Israel.

Presently **Richard K. Merrell** works at Dahlgren Construction, Inc., Yarmouth, Me. .

Howard E. Swenson has started a new business, Polytech Industries, in Attleboro, Mass

1945

Edwin G. Baldwin is now director of Patent Licensing International at Western Electric Co. in New York City. . . . **William P. Densmore,** vice president and general manager of the grinding wheel division at Norton Co., Worcester, served as a discussion leader during a seminar held recently in Clinton, Mass. The seminar was titled: "Getting the most from your schools through school-community collaboration." Mr. Densmore is a member of the state Board of Education and a director of the Central Massachusetts Citizens Involved in Education. . . . **Harold Fleit** now holds the post of vice president of sales and marketing at R. P. Industries, Inc., Marlboro, Mass.

1946

Cecil A. McCurry works as a paper machine supervisor at Crown Zellerbach Corp., St. Francisville, La. . . . **Jack Wexler** currently holds the post of senior vice president of Exxon International, New York City.

1947

Carrol E. Burtner serves as deputy director of the accident and fire prevention division at the U.S. General Services Administration in Washington, D.C.

1948

Kenneth G. Cooke has been appointed assistant superintendent of the Kodak Park paper finishing division at Eastman Kodak Co., Rochester, N.Y. He joined the company's paper service division as a development engineer in 1948. He belongs to the Society of Photographic Scientists and Engineers.

1949

Albert A. Dulac was recently promoted to director of product groups and services, U.S.A., for Motorola's Semiconductor Products Division which is headquartered in Scottsdale, Arizona. He joined the firm in 1963 and prior to his most recent promotion served as staff director of manufacturing. . . . **Stanley R. Hine** is a controls engineer at Riley Stoker in Worcester. He writes that he has five children and three grandchildren, his youngest son, Nathan, being a freshman at Dartmouth. . . . **John D. Saunier** works as a manager at Snelling & Snelling Personnel in Somerville, N.J.

1950

Russ Khoyhian is president of Design & Process Engineering, Inc., Burlington, Mass. Last November his company's new flexible vertical stacking freezer, which offers high volume in minimum space, was the subject of a feature article in *Quick Frozen Foods* magazine. . . . **Frank J. Sherman, III,** who is chief system planning engineer at Boston Edison Co., is presently on a two-year assignment as a project manager at the Electric Power Research Institute and is located in Palo Alto, Calif. . . . **Robert F. Stewart,** president of the consumer group at Rockwell International Corp., has been named to the additional position of president of the company's Admiral group.

1951

Marshall E. Brown works for Englehard Industries, Plainville, Mass.

1952

Richard G. Bennett is with Dean Witter & Co., Boca Raton, Fla. . . . **George Jeas** was recently named assistant to the executive vice president at Boston Edison Company. Previously he was head of Edison's Computer Division, system operations and planning department. He has been with the firm since 1952.

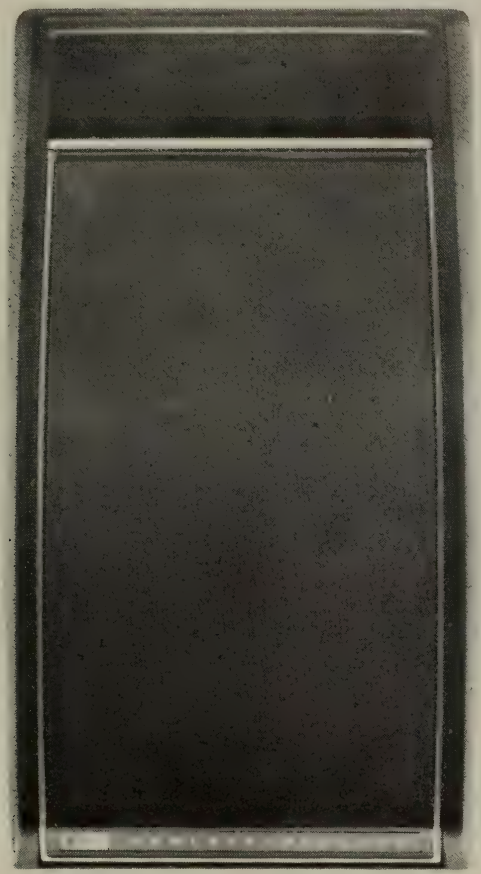
1953

Dr. **Michael N. Hoechstetter** now works for the Ashland Chemical Co. in Columbus, Ohio. Earlier he had been with the Chemical Abstracts Service for fifteen years. . . . **Robert C. Jacino** holds the position of director of international manufacturing at Abbott Laboratories, North Chicago, Illinois.

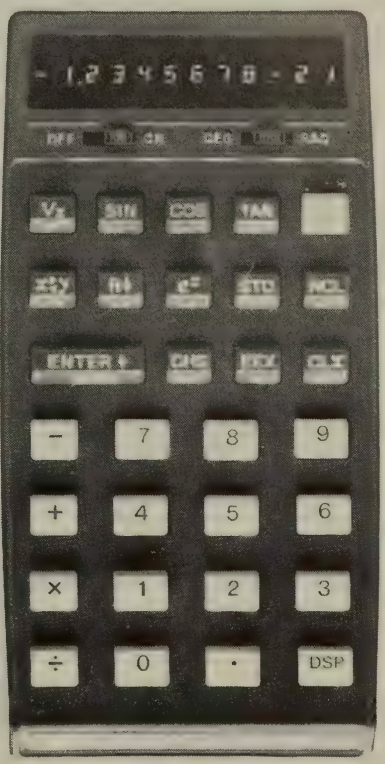
1954

Robert A. Luoma is a senior systems engineer at General Electric Co., fast breeder reactor department, Sunnyvale, Calif. . . . **Milton Meckler** writes that his firm, Meckler Associates of Los Angeles, is now a member of the energy systems and services group of Envirodyne, Inc. He continues as president of his company and has also been appointed president of Envirodyne Energy Services (EES). This group emphasizes total environmental planning, testing engineering and project management. His companies are facing the energy crisis by utilizing their ability to design, install and manage on-site power generation plants with heat recovery. Trans World Airlines and the Queen Mary are among those who have looked to EES for total energy concepts. . . . **William Schoenemann** continues as director of manufacturing operations at Microform Data Systems, Menlo

Hewlett-Packard introduces a smaller uncompromising calculator: the HP-21 Scientific.



$125.00.*



Now $125.00 buys:

More power than our HP-35. The HP-21 performs all log and trig functions, the latter in radians or degrees. It's our only calculator short of the HP-45 that lets you:

- convert polar to rectangular coordinates, and back again (→P, →R);
- do register arithmetic (M+, M−, M×, M÷);
- calculate a common antilog (10×) with a single keystroke.

The HP-21 also performs all basic data manipulations and executes all pre-programmed functions in a second or less.

Smaller size. 6 ounces vs. 9 for our HP-35.

Full display formatting. The display key (DSP) lets you choose between fixed decimal and scientific notation and lets you control the number of places displayed. (The HP-21 always uses all 10 digits internally.)

If a number's too large or small for fixed decimal display, the HP-21 switches automatically to scientific. If you give it an impossible instruction, its Display spells E-r-r-o-r.

RPN logic system. Here's what this unique logic system means for you:

- You can evaluate any expression without copying parentheses, worrying about hierarchies or re-structuring beforehand.
- You can solve all problems your way—the way you now use when you use a slide rule.
- You see all intermediate answers immediately.
- You can easily backtrack when you err.
- You can re-use numbers without re-entering them. The HP-21 becomes your scratch pad.

H-P quality craftsmanship. One reason Nobel Prize winners, astronauts, conquerors of Everest, America's Cup navigators and over 500,000 other professionals own H-P calculators.

Your bookstore will give you a demonstration. They'll show you how much performance $125.00* can buy. If they don't have the HP-21 yet, call 800-538-7922 (in Calif. 800-662-9862) for the name of a dealer who does.

HEWLETT hp PACKARD

Sales and service from 172 offices in 65 countries.
Dept. 239, 19310 Pruneridge Avenue, Cupertino, CA 95014

615/13

*Suggested retail price excluding applicable state and local taxes—Continental U.S.A., Alaska & Hawaii.

Park, Calif. He established the manufacturing and field service capability for the product line consisting of manual and computer controlled high density microfilm readers. . . . **Wilfred F. Taylor** is self employed with Crowd and Taylor, Yarmouth Port, Mass.

1955

John F. Conlon, Jr., has been employed by the Environmental Protection Agency, Region I, in Needham Heights, Mass. . . . **Henry L. Manseau** works at Incoterm Corp., Natick, Mass.

1956

David C. Provost, Jr., is a loss prevention engineer at Schirmer Engineering, Niles, Ill.

1957

Raymond E. Archambault is now with Digital Equipment Corp., Maynard, Mass. . . . **James H. Brigham, SIM,** was recently appointed manager of marketing services at Bay State Abrasives Division, Dresser Industries, Inc., Westboro, Mass. He will be responsible for market planning, distributor sales promotion, sales training, marketing communications and customer service department activities. . . . **Stuart R. Hamilton** holds the position of president at H. P. Alarms, Inc., in Framingham, Mass. . . . **Constantine Rhodes** has joined Sylvania in Needham, Mass.

1958

Dr. **David S. Crimmins** has opened an office for the practice of dentistry in Palmer, Mass. He holds a master's degree in chemistry from the University of Wisconsin; a SCD in metallurgy from M.I.T.; and a DMD from the University of Pennsylvania School of Dental Medicine. . . . **Roger A. Litman** works for North Shore Fuel, Revere, Mass. . . . **Joaquim S. S. Ribeiro** was recently elected a director of the Mechanics National Bank, Worcester. He is vice president and treasurer of Jamesbury Corp. and a trustee of the Memorial Hospital and of the Central New England Colleges. . . . **Walter Veith** has been elected president of the Sterling Precision Export Corporation, West Palm Beach, Fla. He has had extensive executive experience in the international marketing field and is fluent in five languages

1959

David G. Holloway serves as chief engineer at Parker & Harper Mfg. Co., Inc., Worcester. . . . **Chester F. Jacobson** is a program engineer at Gillette Co., Boston. . . . **Marshall P. Krupnick** has become a member of the law firm of Grand and Krupnick in Hallandale, Florida. . . . **Eric G. Rorstrom** is with Northeast Utilities in Berlin, Conn.

1960

John W. Biddle has been named manager of employee relations at Norton Co. in Worcester. He will be responsible for the formulation and direction of policies and programs designed to maintain effective employee relations. Biddle joined the firm in 1963 as an industrial engineer. He was made supervisor of industrial engineering, engineering and construction services in 1969 and in 1970 was named superintendent of planning and control for the company's engineering and construction services. . . . **Paul M. Bryon** now works at General Electric in Schenectady, N.Y. . . . **Earl G. Erickson, SIM,** a former equipment engineer at Warner & Swasey Co., Worcester. has retired. . . . **Richard L. Gess** recently received his master's degree in engineering science from Pennsylvania State University, University Park, Pa. . . . **Fred W. Kloiber** is on the professional and technical staff at Princeton University in Princeton, N.J. . . . **Peter A. Lajoie** was named applications engineer at Data Technology, Inc., Watertown, Mass. He is responsible for all the firm's applications and sales effort for their encoder products line. Previously he was the engineering manager of Trump-Ross Industrial Controls, Inc., Billerica. . . . Currently **Sang K. Lee** is a senior patent attorney for Motorola, Phoenix, Arizona. . . . **Edward J. Sappet** serves as a general foreman at GTE Sylvania in Needham, Mass.

1961

Edward R. Desplaines is employed at United Engineers & Constructors, Boston. . . . **Martin G. Gordon** holds the post of manager of the micro-processor division at Transitron Electronic Corp., Wakefield, Mass. . . . **Lee P. Hackett** is now assistant vice president of the American Appraisal Co., Inc., Milwaukee, Wisc. . . . **William A. Maertens** received one of the four distinguished honor awards given by the Texas A & M University College of Education at recent commencement exercises. He was awarded a degree in industrial education and plans to enter the field of electronics. . . . **Thomas M. Pantages** teaches science at Gloucester (Mass.) High School. . . . **Thomas L. Maloney** is a stockbroker at Kennedy-Peterson, Inc., East Hartford, Conn.

1962

Richard O. Allen, formerly a mathematics and science instructor at Blair Academy, Blairstown, N.J., has now returned to industry and is the quality control manager for Chesebrough Ponds, Inc., at the Instrument Division in Watertown, N.Y. . . . **Anthony R. Biancaniello** has been employed by Arthur D. Little, Inc., Cambridge, Mass. . . . Presently **Charles V. Burdick, Jr.** is a senior supervisior of process development at E. I. duPont in Bellaire, Texas. . . . Currently **Robert R. Cassanelli** holds the post of group leader for General Foods Corp. in Dover, Delaware. . . . **George H. Forsberg** is a process assistance superintendent for Monsanto in London, England.

The Rev. **Paul W. Goranson,** acting vicar of Grace Episcopal Church, Webster, Mass., was ordained an Episcopal priest on January 25th. . . . **Ralph G. Johanson** recently moved to the Louisville (Ky.) office of G. Reynolds Watkins Consulting Engineers, Inc., where he has assumed responsibilities for the civil and sanitary engineering operations of that office. A professional engineer, his accomplishments have included final design of the Fort Knox, Ky., sewage treatment plant and he has led his firm's joint design responsibilities on the $73 million waste water treatment expansion and improvements for Sanitation District No. 1 in Campbell and Kenton Counties, Kentucky.

Philip M. Keenan has been named environmental engineering supervisor at Colt Industries Firearms Division, Hartford, Conn. In 1968 he joined the company as a manufacturing engineer. Currently he is completing work on his master's in environmental engineering at RPI. . . . **Robert M. Kendrick,** SIM, was appointed sales manager, North America, textile service parts division of Leesona Corporation. He will be responsible for textile service parts selling activities in North America and will be located at the Leesona Regional Center in Ft. Mill, S.C. Earlier he was with Crompton & Knowles Corporation and Curtis & Marble Corporation. . . . **John J. McDonnell** serves as a systems programmer at Thom McAn Shoe Co., Worcester. . . . Dr. **Kenneth D. Roettger** is now coordinator of the Mt. Senario College Drug Abuse Prevention and Intervention Project in which he coordinates all drug and alcohol projects in a six-county area in northern Wisconsin. He is developing innovative activity programs for nineteen high schools. . . . **David K. Smith** is a project engineer for the renewal and extension of a water supply system for the city of Bogor in Indonesia.

Happy days will be here again...

Grant Wood, "American Gothic," courtesy of The Art Institute of Chicago

. . . when you invest in WPI's Pooled Life Income Fund

Consider these attractive advantages for Alumni investors:

* A generous annual rate of income for the rest of your lifetime (and that of a designated beneficiary, if you so choose).
* The satisfaction of making a gift during your lifetime which will become a permanent part of WPI's financial resources.
* A charitable contribution deduction on your federal income tax return for the year in which you make the gift, *plus* reduction of the eventual tax on your estate.
* Careful management of your assets by experienced investment counsellors.

You'll be pleasantly surprised at how easily you can "do something substantial" — for yourself, your beneficiaries, and for WPI — through the WPI Pooled Life Income Fund. (And so will our steadfast friends pictured above, when they find out!)

For additional information, please write:

Director of Planned Giving
Office of University Relations
Worcester Polytechnic Institute
Worcester, Massachusetts 01609

Or, you may use the card enclosed in this issue to request information about the WPI Pooled Life Income Fund. We'll respond promptly.

We proved the high performance points of Norton diamond multi-points.

Norton Multi-Point Diamond Dressing Tools provide uniformly consistent diamond size, distribution, and concentration...right down to the nub!

For a long time now, you've been hearing about the consistent high quality and performance of Norton Multi-Point Diamond Dressing Tools. And the fact that the diamonds are uniform in size and evenly distributed throughout the diamond section (matrix) by a patented process. All of this is done to assure you consistent duplication of dressing action on wheel after wheel... right down to the tool shank!

Now, to prove it, a typical Norton dressing tool was put to a grueling life test* on very hard grinding wheels. You can see the results in the "before-and-after" photo of one tool above. After repeated dressings, the tool retained virtually the same number of diamonds, all relative in size and uniformly spaced.

This means truly dependable dressing performance. And true value, too. Norton multi-point tools give you much more performance for much less money than single-point tools. Plus more productivity without resetting, maximum dressings per carat, and faster dressing rates. And... they don't reflect current price increases in the diamond market.

Stocks are available — off the shelf — for nearly any dressing application from your Norton Distributor. Koebel Diamond Tool Division, Norton Company, 9456 Grinnel Avenue, Detroit, Michigan 48213.

*Tools were tested on a Cylindrical Grinder, using Alundum™ (A54-P5VA) wheels running at 820 rpm. Diamond tools were fed 1 mil radial/pass across wheel faces at 30 in/min.

NORTON

Nobody has a better track record.

1963

Born: to Dr. and Mrs. **Daniel Pender** a daughter, Tassili Martine, on December 9, 1974. The Penders are located in West Chazy, N.Y.

Major **Richard B. Allen** is now with the U.S. Army Tradoc, systems analysis activity, at White Sands Missile Range in New Mexico. . . . **Roland F. Boisvert** serves as a manager at Centronics Data Computer Corp., Hudson, N.H. . . . **Richard T. Dann** and five other editors of *Machine Design* magazine were presented with the Jesse H. Neal Editorial Achievement Award on February 13th. The award was given for the magazine's issue on electric vehicles, "Special Report: EV Revival," which was judged best special issue in the category of business publications with gross advertising revenues over $1,250,000. Neal awards are given annually by the American Business Press, an association of business publications. Dann is now associate editor of *Machine Design*. . . . **Paul P. Hausner,** who received his MBA from Syracuse University last year, currently is manager of engineering support at Home-Siegler Division of Lear Siegler, Inc., in Holland, Mich. . . . **Timothy M. Shea** serves as site manager at Kori Nuclear Plant site for Westinghouse Electric in Pusan, Korea.

1964

Benjamin D. Brunell works at Honeywell Corp., Billerica, Mass. . . . **Robert K. Butler** is superintendent of the Worcester Vocational School Department. . . . Dr. **Chao S. Chi** is a principal engineer at Digital Equipment Corp., Maynard, Mass. . . . **James E. Gaffney** works as a consultant for Zeitler Associates in West Redding, Conn. . . . **Donald H. Holmes,** SIM, who was with Warner & Swazey in Worcester, has retired. . . . **William J. Kaszeta** has been employed as a senior engineer at Solar Energy Systems, Inc., Newark, Delaware.

Captain **Robert S. Najaka** has received his master's degree from the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. He is being assigned to Nellis AFB, Nevada with a unit of the Tactical Air Command. He holds the aeronautical rating of senior pilot. . . . **Eugene E. Niemi, Jr.,** recently received his PHD in mechanical and aerospace engineering from the University of Massachusetts. He was awarded a summer faculty fellowship by the National Aeronautics and Space Administration. He spent last summer at Langley Field in Hampton, Va., working with a NASA design team studying air-surface transportation systems. Currently he is an assistant professor of mechanical engineering at Lowell Technological Institute and teaches aerodynamics and fluid mechanics. . . . **Robert W. Palmer** is with the Advanced Weaponry Systems Division, U.S. Navy, in Washington, D.C. . . . **Charles F. Schoenmann** holds the post of senior analytical engineer at Hamilton Standard, Windsor Locks, Conn. . . . **John R. Wood,** SIM, is manager of manufacturing engineering at Dymo Industries, Inc., Randolph, Mass.

1965

Married: **Kenneth B. Adrian** and Miss Jean E. Beaudoin on January 17 in Worcester. The bride graduated from BU and Western Kentucky University. She is a credit analyst at Wright Line/Barry Wright Corp., Worcester. The groom is a systems analyst at Digital Equipment Corp., Westminster.

William J. Barlow, Jr., SIM, was recently named vice president of operations for the eastern division of Wyman-Gordon Co. Since joining the company in 1943 he has held several management positions in engineering and manufacturing. Prior to his promotion he was division manager of operations.

Ronald Chand, owner of Arsee Design & Manufacturing, Inc., Worcester, received his American citizenship last December. . . . **Wayne E. Eddy** is with the New Hampshire Department of Public Works & Highways in Concord. . . . **James L. Hammett, Jr.,** works for the Foxboro (Mass.) Company. . . . **Clinton F. Kucera, Jr.,** is now manager and quality control engineer for General Electric in Fitchburg, Mass. . . . **Ronald R. Schultz** works as an applications programmer at Computer Consoles in Rochester, N.Y. . . . Dr. **John T. Wilson** has been named a vice president at the structural engineering firm of Paul J. Ford and Co., Columbus, Ohio. He joined the firm at its inception in 1970. The Franklin County chapter of the Ohio Society of Professional Engineers elected him the "outstanding young engineer" for 1975.

1966

Joseph G. Acker recently received his MBA from Bucknell University in Lewisburg, Pa. . . . **J. William Bowen** has been appointed vice president of the financial controls group at the Chase Manhattan Bank in New York City. He joined the bank's management information division last year. Previously he was an assistant administrator of housing and development for New York City. . . . **Ronald C. Hayden** is a sales engineer at Fisher Controls Co., Marshalltown, Iowa. . . . **Edward E. Johnson** has joined B. F. Perkins, a division of Roehlen Industries, Chicopee, Mass., where he serves as a project engineer. . . . **Robert A. Lisauskas** is a supervisor at Riley Stoker Corp., Worcester.

Carl D. Meredith, Jr., is a process engineer at Ventron Corp., Danvers, Mass. . . . **Robert L. Plum** works as a project engineer at Dames & Moore, Seattle, Washington. . . . Dr. **Joseph E. Whalen** is a physicist with Operations Research, Inc., Silver Spring, Md. . . . Navy Lt. (j.g.) **Frank J. Yohan, Jr.,** recently graduated from the military justice lawyer course at the Naval Justice School in Newport, R.I. He received instruction in the application and administration of military law and procedures. He has been scheduled to report to the Naval Legal Service Office in Norfolk, Va.

1967

Charles F. Bergeron is now a lead controls engineeer at Stone & Webster, Boston. . . . **Frank D. Manter** has been employed by E.C.A., Cambridge, Mass. . . . Currently **Richard B. Plummer** works for LRC in Hudson, N.H. . . . **James A. Wentworth** serves as a research mechanical engineer for the Federal Highway Administration in Washington, D.C. . . . **Gregory J. Goulet** has joined Fawn Realty Inc., Nashua, N.H.

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

1968

Married: **Geoffrey P. Tamulonis** and Miss Delfina Manuella de Teixeira recently in Lisbon, Portugal. The bride graduated from Lisbon University. Her husband is employed by ITT and has been stationed in Portugal and Mozambique.

Paul G. Beaudet, an office engineer for J. A. Jones Construction Co., is now located in Longview, Texas, where he is involved with the expansion of the Schlitz brewery. . . . **Alan R. Berg** is associated with the City of Worcester Bureau of Engineering. . . .**Richard J. Caprioli** is a project engineer for E. I. du Pont de Nemours, Leominster, Mass.

Galo O. Cascante-Lopez of Quito, Ecuador, has been a participant in the International Visitor Program sponsored by the U.S. Department of State. He visited the United States to increase his understanding of the application of advanced technologies in electronics to the needs of society. Currently he serves as program manager for Electronics and Communication Industries in the Andean Common Market Secretariat which represents Venezuela, Colombia, Ecuador, Peru, Bolivia and Chile. Also he works as a consultant for the Ecuadorian Institute of Telecommunications. Earlier he was with the NASA Satellite Tracking Station at Cotopaxi, Ecuador; was a professor-researcher at Escuela Politecnica Nacionál; and a consultant for the departments of industry and technology.

Edward M. Chausz is a process engineer at American Cyanamid in Wallingford, Conn. . . . Presently **Gerald F. Cronin** works for Coppus Engineering Corp., Worcester. . . . **Frederick J. Eckert** is a machine design engineer at Tulox Plastics in Norwalk, Conn. . . . **Israel Mac** has been promoted to the position of comprehensive development plans coordinator in the Atlanta (Ga.) department of budget and planning. He will be responsible for the preparation and publication of the City of Atlanta's comprehensive plans. Prior to his promotion he had served as principal transportation planner. . . . **William R. Nordstrom** is the manager of Cryogenic Gases, Inc., Westboro, Mass. . . . **John J. Orciuch** is a project engineer at American Cyanamid, Wallingford, Conn.

Andrew L. Piretti works as a special agent for the Northwestern Mutual Life Insurance Co., Bloomfield, Conn. . . . **Raymond F. Racine** is a Senior engineer in the rotating equipment department of Ralph M. Parsons Co., in Pasadena, Calif. . . . Dr. **Richard A. Snay** is a mathematician with the National Geodetic Survey in Rockville, Maryland. . . **John R. Trudeau** is a systems engineer at Hewlett-Packard, data systems division, Cupertino, Calif. Formerly he was with the processes branch of GE's research and development center in Schenectady, N.Y. . . . **Frederick W. White** serves as a project engineer at American Bosch, Springfield, Mass. . . . **Mark A. Freyermuth** recently received his master's degree in marketing from the University of Massachusetts. He is an electronics sales engineer for GE in Wellesley.

1969

David J. Barrett is employed as an associate production engineer at New England Power in Salem, Mass. . . . **Jeffrey C. Bernard** serves as an associate physicist at Calspan Corp., Buffalo, N.Y. . . .**Harvey S. Bierenbaum** holds the post of assistant professor of chemical engineering at the University of South Florida in Tampa. . . . **Bruce L. Carlson** is with Northeast Utilities in Middletown, Conn. . . . **Richard W. Check** works for Black, Crow and Eidsness, Inc., Atlanta, Ga.

Michael J. Cohen holds the position of marketing representative at Scientific Time Sharing Corp., Boston. . . . **Gregory B. Enz** is an instructor for AT&T at the Bell System Center for Technical Education, Lisle, Ill. . . . Dr. **Robert R. Gagne** serves as a research instructor in the chemistry department at California Institute of Technology in Pasadena. . . . **Neil Glickstein** is now a graduate student at San Francisco State University, where he is studying marine biology. . . . **William E. Hallock** is president of Mimco Associates, Londonderry, N.H. . . . **Craig L. Mading** is a graduate student at Boston University, and **George T. McCandless, Jr.,** is doing graduate work at the University of Minnesota in Minneapolis.

Stephen E. Platz serves as a scientific programmer at Pratt & Whitney Aircraft in East Hartford, Conn. . . . **Robert B. Reidy** works for Abco Engineering Corp., Pawtucket, R.I. . . . **Martin Surabian** has been promoted from senior mechanical engineer to mechanical engineering group supervisor with Bechtel Power Corporation, Gaithersburg, Md. . . . **Henry S. Sweet** is a systems analyst for Travelers Insurance, Hartford, Conn. . . . **Richard J. Warren** holds the post of president at Ben Mont Corp., Bennington, Vt. . . . Dr. **Charles M. Zepp,** who received his PHD from the University of Massachusetts last year, is currently employed at Polaroid Corp., Cambridge, Mass. . . . Currently **Steven Zieve** serves as a program analyst for the Hartford Insurance Group in Hartford, Conn.

1970

Married: **Michael F. Sullivan** and Miss Lorrene Mae Waller on November 30, 1974, in Louisville, Kentucky. Mrs. Sullivan graduated from Union College, Barbourville, Ky., earning her master's degree from the University of Louisville. Her husband is a project engineer at Colgate-Palmolive Co. in Louisville. . . . **Raymond T. Pajer** to Miss Beverly A. Lowe on November 29, 1974 in Orange, Connecticut. Mrs. Pajer, a graduate of Southern Connecticut State College, teaches in a private school in Westport. Her husband received his MSEE in 1972 from New York University and is employed as an electrical engineer at Yale University.

Born: to Mr. and Mrs. **David J. Lawton,** a son, David Edward, on September 15, 1974. David has a sister, Susan Marie, 2. Lawton works in the field of air pollution control for Koppers Company, Environmental Elements Corporation, of Baltimore, Md. As a field engineer, he has traveled extensively throughout the U.S. and Canada.

Richard F. Abrams is a process engineer at CIT Nuclear Division of Dasa Corp., Waltham, Mass. . . . **Michael E. Arslan** works at Hamilton Standard, division of United Aircraft, Windsor Locks, Conn. . . . **Gregory E. Barnhart** has been employed at Siliconix in Vienna, Va. . . . **Philip D. Bartlett, Jr.** is a group supervisor at DuPont, Antioch, Calif. . . . **Henry R. Block** was recently promoted to nuclear project engineer for Pennsylvania Power & Light Company's Susquehanna Nuclear Plant Project. He had been an engineer at the Susquehanna Project since joining PP&L's nuclear department in 1972.

David R. Brown had been promoted to engineering supervisor in the water control equipment engineering department at Rodney Hunt Co., Orange, Mass. He began working at the firm in 1971 after having been employed by Alden Research Laboratory. . . . **Robert DiDomenico** holds the post of senior engineer at American Bosch, Springfield, Mass. . . . **William F. Dudzik** is with the department of the Navy, Navy Yard, Washington, D.C. . . . **Domenic Forcella** was recently elected justice of the peace in Plainville, Conn. Dom says he is giving special rates to fellow graduates from WPI.

. . . **James F. Ford** has been promoted to senior actuarial associate at State Mutual Life Assurance Company of America in Worcester.

Jack Gale is now the golf pro at the Rochester (N.H.) Country Club. For the past three years he has been chief assistant pro at Holden (Mass.) House and Country Club. Gale, a Class A golf professional, served as vice president at large and treasurer of the New England Assistant (golf professional) Association.

Coming Attraction

A NEW OPPORTUNITY FOR ALUMNI

TO PUT MORE MONEY INTO YOUR ESTATE PICTURE

... AND AT LESS COST THAN YOU MIGHT EXPECT

THROUGH YOUR ALUMNI ASSOCIATION

$10,000 TO $50,000 OF GROUP TERM LIFE INSURANCE TO AGE 70, YOU OR YOUR SPOUSE

GROUP PREMIUMS FOR EACH $10,000*	
At Ages**	½-yearly
Under 30	$12
30–34	13
35–39	17
40–44	24
45–49	37
50–54	58
55–59	92
60–64	92
65–70	92

*EACH UNIT OF COVERAGE REDUCES FROM $10,000 TO $7000 AT AGE 60 AND TO $4000 AT AGE 65.

**Age last birthday as of postmark date on your return envelope.

Now being presented by mail. Closing May 30th.

Address inquiries to ADMINISTRATOR; AID, Division of EL Corp., 962 Asylum Ave., Hartford, CT 06105

Roses are red, Violets are blue, Sugar is sweet And lemons are too!

Maybe you're a diabetic and must carefully control your intake of sugar. Or maybe you're just concerned with the amount of sugar in your diet. With all the processed, packaged, and prepared food, the soft drinks and the snacks we eat, the average person consumes a lot of sugar in the course of a year. And nutritionists are warning us increasingly of the dangers to our health from the excessive and empty calories in sugar – any kind of sugar, including honey and blackstrap molasses.

Dr. Robert J. Harvey, PhD '70, has an answer to that problem that very nearly falls into the category of being a miracle. He is trying to market an extract from an African fruit which has some amazing properties and could go a long way toward reducing the amount of sugar we eat.

He calls his product the "Miracle Fruit Drop." It is a protein extracted from the berries of a shrub-like tree (scientific name: *Synsepalum dulcificum)* first discovered in Africa centuries ago. The berry, when chewed, reacts with the tastebuds on the tongue to cause the receptors that normally trigger the sour (and to a much lesser extent) bitter sensations to produce instead the sweet taste.

Although the African fruit has been known for a long time, it was only a local curiosity because the fruit rapidly lost its powers after being picked. A few hours off the tree and the effect was entirely gone. By discovering how to extract the protein which is responsible, Harvey has made possible the widespread and commercial use of the effect. The company is growing the fruit trees on plantations in Jamaica (where they thrive even better than in their native Africa), with some acres currently planted.

In its present form the Miracle Fruit Drop is a tablet that is chewed before eating. After taking one of these tablets, you can enjoy sweet and extremely natural lemonade, for example, using only fresh lemons and water. Normally far too tart for comfort, the lemon becomes an enjoyable fruit that can be eaten like an orange. (Watch your ulcer, of course: it's still acid, even if it tastes sweet!)

Of course, this "miracle" has a few shortcomings. For one thing, it won't sweeten your coffee – its effects are primarily on acidic foods. It makes beer and wine too sweet for many people. Then too, there are some foods we expect to taste acidic: eating a green salad with vinegar and oil after chewing a Miracle Fruit Drop provides a strange (though not unpleasant) sensation.

The Miralin Company of Hudson, Massachusetts, of which Dr. Harvey is president, has also prepared an extensive cookbook and a number of special prepackaged foods – salad dressing, desserts, sauces, and others – meant to be used in conjunction with the tablets. They feel the ultimate potential and the most significant use for the protein extract is in the vast field of processed and prepared foods, which use sugar and corn syrup extensively as sweeteners to increase the popularity of their products.

At present there are two major bars in the way of Harvey's miracle. First is the cost, presently very high at about $2 for a box of 18 drops. Second is the fact that the Food and Drug administration has so far refused to allow Miralin to market the drops, claiming them to be a chemical food additive rather than a natural protein which is a food itself. The company has been engaged in a long running battle with the federal agency to get the tablet cleared for public sale.

Philip H. Johnson teaches at the Bancroft School in Worcester. . . . **Alan M. Kolaczkowski** serves as a systems engineer at General Atomic Co., San Diego, Calif. . . . **Stephen Koshgarian** works as a shift superintendent at Continental Can Co., Passaic, N.J. . . . **James S. Lovendale** is a senior programmer at Simonds Cutting Tools in Fitchburg, Mass. . . . **Edward M. Mason** works as a manufacturing projects manager at Standard Oil of Indiana in Chicago. . . . **Alexander Murdoch** is a graduate student at Purdue University in Lafayette, Indiana, and **William Naas** is doing graduate work at Northeastern University in Boston.

Craig D. Olmsted works for Stone & Webster Engineering Corp., Boston. . . . **Bruce S. Robinson** has been employed by AT&T in Morristown, N.J. . . . **Frederick M. Rymsha** now works for Union Carbide Corp. in Rye, N.Y. . . . **Michael E. Santom** is a field engineer at CBX Development Corp., Leominster, Mass. . . . **John O. Tarpinian** is a graduate student at Boston University. . . . **Stephen A. Turek** is a process engineer at Allied Chemical Corp., Morristown, N.J.

1971

Married: **Louis R. Howayeck** to Miss Sherrill L. Forester on February 1, 1975 in Greenville, Massachusetts. The groom works for the Naval Underwater Systems Center in Newport. . . . **Martin I. Rose** and Miss Denyce A. Dauwalder on August 31, 1974 in Newfield, N.J. The bride, a free-lance copywriter, is a graduate of Becker and the University of Kansas. Her husband is an acoustics engineer for the Electric Boat Division of General Dynamics in Groton, Conn.

Richard J. Carroll holds the post of manager of manufacturing at Warren Pumps, Inc., Warren, Mass. . . . **Joseph B. Carter** graduated with an MD degree from the University of Minnesota Medical School in December. He plans to continue at the university where he will specialize in the study of the ear, nose, and throat. . . . **Bruce R. Desmarais** works for Standard Register, Worcester. . . . **Reginald G. Dunlap** is employed in the container department at International Paper Co. in Mason, Ohio. . . . **Dan Dunleavy** holds the post of sales engineer at Hope Co., Fitchburg, Mass. He received his MBA from Boston University in December. . . . **Paul S. Furcinitti** is a teaching assistant at the University of New Hampshire where he received his MS in physics last year.

Bryan L. Furtek is a graduate student at Yale University, New Haven, Conn. . . . **William P. Garvey** works for Fenwal, Inc., Ashland, Mass. . . . **Gordon E. Govalet** serves as a structural engineer at Riley Stoker Corp. Worcester. . . . **Alan P. Gradet** has been employed as a research scientist at Process Research, Inc., Cambridge, Mass. . . . **Michael Hughes** is with the U.S. Army in Fort Carson, Colo. . . . **Larry N. Hyman,** who has completed three years of active Army service as a lieutenant in the Military Police Corps, has accepted a position with the Michigan division of Dow Chemical. His initial assignment is in the Midland plant. . . . **Walter M. Jensen, Jr.** is an associate professor at Central New England Colleges in Worcester.

Timothy C. Johnson, who had been serving in the U.S. Army, is now at Stone & Webster, Boston. . . . **Alan J. Kaechele** holds the position of programmer/analyst at National Cash Register, San Diego, Calif. . . . **Stephen Katz** is production and inventory control supervisor at Digital Equipment Corp., Westfield, Mass. . . . **Elaine S. Kowalewski** is a graduate student at the University of Connecticut. . . . **Harry E. Lockery** works for Hottinger Balwin Measurement, Inc., Natick, Mass. . . . **Nicola LoStracco** teaches mathematics at Sutton (Mass.) Memorial High School. . . . **Bipin I. Mehta** is a structural designer at Schoenfeld Associates, Inc., Boston. . . . **Anthony J. Monteiro** works for Hudson Light & Power Dept., Hudson, Mass.

The First Federal Savings & Loan Association of Worcester has employed **Donald R. Nadow**. . . . **Gerald J. Orre** is with Audio Visual Service, Worcester. . . . **Michael S. Santora** serves as a project engineer at R. Zoppo Co., Inc., Norwood, Mass. . . . **James H. Snider** has joined Babcock & Wilcox in Lynchburg, Va. . . . **Lawrence J. Sniegoski** holds the post of marketing manager at Panametrics Corp., Waltham, Mass. . . . **Gerald R. Spring** is with the ECC Corporation, Holden, Mass. . . . **William J. St. Hilaire** has joined Riley Stoker Corp. in Worcester. . . . **Gregory A. Taylor** is a design engineer at United Engineers, Knoxville, Tenn.

Paul R. Swenson works as a technical specialist at Alden Research Lab., Holden, Mass. . . . **Joseph A. Thomas** has joined Stone & Webster in Boston. . . . **Walter V. Thompson** holds the position of plant manager at Natural Power Inc., New Boston, N.H. . . . **Thornton H. Waite** is with United Engineers & Constructors, Inc., in Philadelphia, Pa. . . . **Glenn H. White** serves as a teaching assistant at SUNY/Albany, Albany, N.Y. He is a first year graduate student in atmospheric sciences. . . . **Dana H. Worthley** works for Richmond Graphic Systems, Providence, R.I. . . . Currently **Ronald L. Zarrella** is manager of planning at Clairol, Inc., Stamford, Conn. . . . **Michael Zilora** serves as an analyst-programmer at Allendale Insurance Co., Johnston, R.I.

1972

Married: **Urmas A. Volke** and Miss Jacqueline M. Catino on October 27, 1974 in Worcester. The bride graduated from St. Stephen's Central Catholic High School.

Raymond E. Canning works as a medical technologist at Putnam Memorial Hospital in Bennington, Vt. . . . **Barbara A. Cawley** is a graduate student at Elizabethtown (Pa.) College. . . . **Vincent J. Colonero, Jr.** has been employed by Northeast Utilities Service Co., Wethersfield, Conn. . . . **Robert A. Colp** is a process engineer at Foster Wheeler Energy Corp., Livingston, N.J. . . . **John G. Croft, Jr.,** SIM, is now a partner in Woodington Assoc., Worcester, Mass. . . . **Thomas P. Cusson** serves as an assistant engineer for the Central Mass. Air Pollution Control District in Worcester.

Edwin J. Dolph works as a computer applications analyst at Goodyear Tire & Rubber Co., Akron, Ohio. . . . Major **Robert A. Dorf** is chief, data systems division, U.S. Army, Aberdeen Proving Grounds, Md. . . . Dr. **Albert A. Heaney,** who works in advanced weapon control engineering development for GE in Pittsfield, Mass., heads up an advanced development group in the ordnance division. . . . **Theodore D. Johnson** is with the UConn Health Center in Farmington, Conn. . . . **William E. Kamb** serves as a cost engineer at Turner Construction, Cleveland, Ohio. . . . **Paul A. Lavigne** is production control manager at Jamesbury Corp., Worcester. . . . **Paul A. Lawendowski** is a naval officer with the USS Francis Hammond out of San Francisco.

David L. LeBlanc, a dealer salesman for Gates Rubber Co. of Denver, Colo., also serves in a U.S. Army Reserve Control group. He is located in Worcester. . . . Lt. **Steven H. Lutz,** an executive officer with the Army, was transferred to Europe last June. He is with the 82nd Engineer Batallion. . . . **Theodore A. Martin, Jr.,** is a technical specialist at Bowmar Products, Tucson, Ariz. . . . **Richard J. Meighan** holds the post of manager at Impulse, Inc., at Auburn (Mass.) Mall. . . . **Steven M. Kay** is a graduate student at WPI. . . . **John F. O'Donnell** is a civil engineer for the town of Wilmington, Mass. . . . **Edward G. Perkins** serves as a systems administrator-programmer at Blue Streak, Professional Operating Management Group, Inc., Boston. He is also working for his MS in computer science at WPI.

Gene Roe is an instructor in civil technology at Thompson School of Applied Sciences at UNH in Durham. . . . **Raymond W. Scanlon** works as a programmer at Foxboro (Mass.) Co. . . . **Edward D. Schrull** is with Westinghouse Hanford Co. in Richland, Washington. . . . **Shawn L. Sullivan** is a services engineer at Amstar Corp., Boston. . . . Lt. **John L. Tunstall,** a U.S. Air Force pilot, is being assigned to Udorn, Thailand. . . . **Jon R. Wimer** holds the post of textile division manager-New England region for Measurex Corp. of Cupertino, Calif. . . . **John Zorabedian, Jr.,** has moved to GE's boiling water reactor operation in San Jose, Calif. Previously he was president of the Hudson-Mohawk chapter of the Alumni Association.

1973

Married: **Thomas H. Field, III,** to Miss Susan M. Feinzeig on September 21, 1974 in Rindge, New Hampshire. Mrs. Field graduated from David Hale Fanning Trade High School of Practical Nursing, Worcester. Her husband works at Genovese & Associates, Hamden, Conn. . . . Miss **Lorraine C. Lind** of Millbury, Massachusetts to **Richard Caruso,** '75, on April 1, 1974. . . . **Stephen A. Maiorano** to Miss Elizabeth Ann Bradley recently in Providence, Rhode Island. Mrs. Maiorano graduated from Anna Maria College. The groom is employed by Daniel O'Connell's Sons, Holyoke, Mass.

Alan C. Aho works at American District Telegraph Co. in New York City. . . . **Alan L. Amirault,** who is a security guard at Jordan Marsh Co., Worcester Center, is also in the MBA program at Clark University. . . . **Fred S. Banach** has joined the Connecticut Environmental Protection Department in Hartford. . . . **Peter F. Bonaccorsi** is a project engineer at Buck & Pierce, Sanitary Systems, St. Albans, Vt. . . . **Richard J. Bors** is a graduate student in the electrical engineering department at WPI. . . . **Christopher A. Broders** is a

Wyman-Gordon Energy-Saving Campaign Aids Community and Company

The saving of gas, oil and electricity in W-G's energy reduction campaign would supply the needs of some 1,500 to 2,000 homes. And our campaign continues to grow.

As energy shortages deepen, conservation by each user helps ease the crunch for everyone. W-G's effort not only increases company efficiency but can be important to the Worcester area.

Our energy campaign has another benefit also; by rigorous control of all costs — energy is one of W-G's significant costs — we strengthen our competitive ability to maintain sales, production and employment. In these times of business slowdown the community needs all its industries operating as fully as possible.

Metal processing requires a lot of gas, oil and electricity; we're one of the largest users in New England. Our operations have increased and we've been installing improved pollution control equipment which takes additional power. But at the same time we've reduced our energy use some 15%, and are still making progress.

Government Agencies Issue Warnings

The Federal Energy Administration and other agencies, both government and private, are giving plenty of warning on the ways we'll all be affected by the world energy situation. No matter who is to "blame" or how many interpretations come at us from politically motivated sources the problem is real, and we have to learn to live with its implications as they confront us day to day.

At W-G the FEA tells us we can't increase oil usage over last year unless: 1) we can unequivocally *prove* our need, and 2) we have a well-established and effective conservation program. The gas company tells us there's a real possibility of cutback in gas supply to W-G. This area is at the farthest end of the pipelines from the gas fields; weather and supply problems almost anywhere in the country can affect the supply here. Electric power supply seems OK for this year, but since much of our power is generated from high-priced imported oil the supply picture could change, and certainly prices will continue high.

Therefore, to keep up production, provide service to customers and maintain employment, our conservation campaign absolutely must continue as a top priority effort for all.

W-G Initiated Program Almost Two Years Ago

Our Energy Committee was formed in early 1973 to focus attention on stringent control of gas, oil and electricity, the Big Three energies vital to our operation. This was months before the energy crisis was generally recognized, and our Committee was one of the first of its kind anywhere in the country.

The Committee includes T. R. Carlin, Purchasing; J. J. Connealy, Production; R. J. Donley, Energy Engineer; G. L. Dutter, Facilities Engineering; R. F. Goodspeed, Plant Engineering; Michael Hopper, Data Processing; J. P. Molony, Quality Assurance; J. M. Mullaly, Accounting and L. P. Pouliot, Plant Engineering. Ray Donley, an experienced W-G engineer, was assigned full time to the effort.

Supply shortages and price increases were expected and we hoped for some relief through the work of the new Committee. But we certainly didn't anticipate how drastic the shortages or how astronomical the prices would be, nor did we realize how truly significant the conservation campaign could be.

Twin Energy Problems are Here to Stay

The twin troubles of escalating cost and limited supply will be with us for a long, long time.

They affect industry just as they affect homes. They mean changing accustomed ways of doing things, increased inconvenience and discomfort, attention to details we used to overlook, continual search for new ways to economize, significantly altering our living habits. These are now a permanent part of our industrial and personal way of life.

This isn't news, although some people still try to pretend it's unreal or will disappear if they look the other way. What we think *is* news is the fact that it doesn't have to be all gloom, frustration and impossible. Our people have made great strides in meeting the facts head on, have taken on some inconvenience and many changes, and are steadily working to accomplish more.

Thanks To Our People It's Working

Energy saving in industry, just as at home, requires the interest, cooperative understanding and attention to detail of everyone. No individual or committee can do the job alone.

We're proud and appreciative of the support all our people have given this campaign. The record proves it; such accomplishment is impossible without it.

Ways W-G Saves Gas, Oil and Electricity

Many steps have been taken and others are on the way. Some of them are:

1. We removed electric lights and bulbs where not indispensable for acceptable minimum-level lighting for work. The total taken out was over 1,000,000 watts. This is the equivalent of 20,000 50-watt bulbs. . . or 500,000 electric clocks, or 7,000,000 night lights!

2. Lights and motors are turned off when not in immediate use. This seems an obvious idea, but it's not easy to accomplish; it takes added thought and attention by many people to make it work. Under the new facts of cost and limited supply it's worth the effort.

3. Thermostats are set lower, and windows and ventilators are more carefully controlled. Again requiring attention and cooperation of many people.

4. New expansion joints were installed in steam heating lines. This provides increased flexibility of heating control in the plant without undue stresses in the steam piping system.

5. New gas furnaces are designed with "recuperators" which use hot exhaust gases to preheat incoming combustion air going to the furnace burners. They can reduce gas consumption some 15%. However, they're expensive and previously couldn't be justified on a cost-payback basis. But now they are justified by the new facts of decreased supply and increased prices.

6. Improved insulation is being maintained on certain structural members in Grafton gas furnaces. This change by itself will eventually save enough gas to supply several hundred gas-heated homes.

7. We are experimenting with changing furnace linings from firebrick to fiber blanket. This permits faster heating and cooling without cracking the lining and also takes less gas in startup to get the furnace to operating temperature. The total saving can be as much as 15%. However, the fiber lining is more costly to install and is easier to damage when loading or unloading the furnace. Its initial use will probably be in car-bottom units which are loaded outside the heated sections of the furnace.

These are some of the steps we've taken. Ideas come from everywhere and everyone. The Committee acts as collector and coordinator as well as initiator.

If you have any suggestions or would like to discuss any part of our energy campaign we will appreciate hearing from you. Please get in touch with our Committee chairman, Tom Carlin. You can phone him at 839-4441 or write to him,

Wyman-Gordon Company
Worcester, Mass. 01601.

Forging form and function into metal
WG WYMAN-GORDON

design engineer at Hamilton Standard in Windsor Locks, Conn. . . . Presently **Jason J. Burbank** works for the Environmental Protection Agency, Office of Air & Water, Emission Standards Division, Durham, N.C. . . . **James F. Burke** is an assistant engineer at United Engineers & Constructors, Boston.

Richard N. Carr, Jr., serves as an assistant actuary at Indianapolis Life Insurance Co., Indianapolis, Ind. . . . **Paul H. Clark** has joined Digital Equipment Corp., Maynard, Mass. . . . **Lee Cooper** is with Ingersoll-Rand Co., Painted Post, N.Y. . . . **V. A. Damle** has become associated with Proctor & Gamble in Toronto, Canada. . . . **James W. Davis** works for Chicopee Manufacturing Co. as manager of quality assurance at the firm's Gainesville (Ga.) finishing plant. . . . **Thomas Deshefy** works for Northeast Utilities in Wethersfield, Conn. . . . Currently **John F. DiGregorio** services as a process development engineer at General Electric, Valox section, in Mt. Vernon, Indiana. . . . **James P. DiMilia** has been employed by Codman & Shurtleff, Inc., Randolph, Mass.

Michael R. Divis is a graduate student at the University of Montana. . . . Also a grad student is **Eugene A. Eng,** who is at Wentworth Institute in Boston. . . . **Thomas P. Farrell** has been employed by the Foxboro Co., East Bridgewater, Mass. . . . Presently **Timothy A. French** is a photo department supervisor for E. I. du Pont in Parlin, N.J. . . . **James E. Gagliardo** is with Feecon Corp., Westboro, Mass. . . . **Geoffrey Gerhard** holds the position of president at West Wind Co., Farmington, N.M. . . . **John K. Gill** works for United Engineers & Constructors, Inc., Boston. . . .**John A. Goulet** is a graduate student at RPI, Troy, N.Y.

Brian S. Guptill, who works for Raytheon, is currently on a two-year assignment in Germany. . . . **Richard S. Hackett** is manager of production planning at Johnson Steel & Wire Co., Inc., Worcester. . . . **William L. Hobbs** is doing graduate work at M.I.T. . . . **Richard Hully** serves as president of Hias, Inc., Worcester. . . . **Basil K. Karanikos** has been appointed a controls engineer in the engineering section of Bay State Abrasives Division, Dresser Industries, Inc., Westboro, Mass. . . . **Joshua O. Kolawole** has joined the GE Research and Development Center in Schenectady, N.Y. He plans to study for his MSEE at RPI in Troy. . . . **Christopher M. Kralik** is with Exxon Research & Engineering, Florham Park, N.J.

Thomas J. Landwehr is a sales agent for New England Mutual Life Insurance Co., Worcester. . . . **Bruce Olsen** works as a system programmer at Thom McAn, Worcester. . . . **Maurice D. LeTourneau** teaches at Quabbin Regional High School, Barre, Mass. . . . **Michael Lucey** is still with the Tighe & Bond division of Sippican Consultants International in Holyoke, Mass. . . . **Robert C. Mackenzie** has joined Curren Assoc., Northampton, Mass. . . . **Paul L. Martin** serves as a design engineer at Kingsbury Machine Tool Corp., Keene, N.H. . . . **William H. Mawdsley** was recently promoted to actuarial associate at State Mutual Life Assurance Company of America in Worcester. . . . **Peter McDermott** continues as a chemical engineer at Auroc Corp., Canton, Mass. . . . **Thomas J. McInerney** holds the post of plant supervisor-latex products, at Sponge Rubber Products, Shelton, Conn. . . . **Paul W. Melnick** works at Avco Lycoming, Stratford, Conn. . . .

Dorothy O'Keefe now serves as an industrial engineer at Norton Co. in Worcester. . . . **Bruce C. Parent, Jr.,** SIM, is a product manager at Norton Co. . . . **Frederick J. Paris** works for General Electric Co., Lynn, Mass. . . . **Paul J. Parulis** is a designer-engineer in the fired heater division at Foster Wheeler Corp. in Livingston, N.J. . . . **Clifford P. Peterson** is associated with the Bank of Tokyo, Ltd. (New York Agency), New York City. . . . **John D. Perreault** is a civil engineer for the town of Shrewsbury, Mass. . . . **Michael D. Peterson** holds the position of marketing coordinator at Valtec Corp., West Boylston, Mass. . . . **Spiro G. Pitsaris** works for Table Talk, Inc., Worcester.

Dr. **Rajeshwar Mathur** is an assistant professor at Fitchburg (Mass.) State College. . . . **Rand J. Refrigeri** has been employed by C & R Plumbing and Heating in Leominster, Mass. . . . **Mark S. Richards** works as a commissary manager at Pizza Transit Authority, Chapel Hill, N.C. . . . **Martha Ryan** is with the Medical Research Insitutue of Worcester, Inc., at City Hospital in Worcester. . . . **R. Lee Savery, Jr.,** has been employed by Barnstable County Hospital, Pocasset, Mass. . . . **William A. Schofield** is manager, bucket development engineering, at GE in Fitchburg, Mass. . . . **Samuel E. Schumacher,** SIM, serves as a senior industrial engineer at Russell Harrington Cutlery, Southbridge, Mass.

Charles Scopelitis is an assistant engineer at Northeast Utilities, Hartford, Conn. . . . **Robert G. Skillin,** SIM, is vice president-operations at Curtis & Marble Corp., Worcester. . . . **Robert L. Steinberg,** who is in the Navy, is currently assigned to the USS Schenectady out of San Francisco. . . . **Douglas H. Tarble** has been named to head a new department in the Clairol division of Bristol-Myers Co. He will be coordinator of new products and will be responsible for inception of marketing ideas through research and development product scale-up as well as acquisition of components and raw materials by the purchasing department. Also, he will evaluate in-house and out-of-house production capacity. He joined Clairol in 1973 as a material controller. . . . **Thomas H. Uccellini** works for Structural Enterprises, Inc., Troy, N.Y. . . . **Michael J. Varga** is with the Barden Corp., Danbury, Conn. . . . **Andrew B. White** is a senior applications consultant at Tymshare, Inc., West Newton, Mass. . . . **John B. Whitney** is doing graduate work at WPI. . . . **Robert L. Winans, Jr.,** has been employed by SGB Universal, Red Hook, N.Y. . . . **Donald G. Woodward** serves as project manager at Riley Stoker Corp., Worcester.

1974

Married: **Steve Dacri** and Miss Sheryl Anne Ollie in Detroit, Michigan on January 3, 1975. Mrs. Dacri graduated from Eastern Michigan University and is executive secretary for her husband. The groom is a professional magician and owner of Steve Dacri's Magic and Fun Shop in Worcester. . . . **Joseph G. Bukowski** to Miss Ann E. Page on December 14, 1974 in Middleton, Massachusetts. The bride is a Becker graduate and is employed at Varian, Beverly, Mass. Her husband works for Wheelabrator-Frye, Inc. . . . 2/Lt. **Thomas J. Kielick** and Miss Cheryl Anne White on February 8 in Worcester. The bride graduated from the Memorial Hospital School of Nursing and was a nurse at Wachusett Home Health Care Agency. Lt. Kielick is an army radio systems officer stationed in Hoechst, Germany, where the couple is now residing.

John D. Adams has been employed by the National Security Agency, Ft. Geo. G. Meade, Md. . . . **Duane R. Arsenault** is now a project engineer at Hamilton Standard, Windsor Locks, Conn. . . . **James M. Asaro** serves as an ensign at the U.S. Naval Air Station, Pensacola, Fla., where he is a student aviator working for his wings. . . . **Barbara J. Bain** is a data systems analyst at Southern New England Telephone Co., New Haven, Conn. . . . **Robert H. Becker** is a self-employed computer software consultant in Marlboro, Mass. . . . **Ali L. Beyranevand** serves as a senior programmer at Honeywell in Billerica, Mass. . . . **Stephen E. Braley** is a grad student at Georgia Southern College, Statesboro, Ga.

Paul R. Boulier works as a junior research associate at Fabric Research Laboratories in Dedham, Mass. . . . **Daniel J. Brunell** has been employed as an industrial engineer at Louis Lefkowitz & Bro., Milltown, N.J. . . . 2/Lt. **Christopher S. Cigal,** who recently completed the mechanical maintenance officers' course at Aberdeen Proving Grounds, is now assigned to 76th HEM Co., Ft. Knox, Ky. . . . **John E. D'Amico** works for United Nuclear Corp., Uncasville, Conn. . . . **Francis E. Dempsey, Jr.,** has been employed as a junior programmer by IBM in Kingston, N.Y. . . . **William J. Dewkett, Jr.,** teaches at North Salem (N.Y.) High School. . . . **John H. Fellows** works as a structural engineer at Buell/Envirotech Corp., Lebanon, Pa. . . . 2/Lt. **Robert W. Flanagan, Jr.,** U.S. Army, is with a student detachment at Fort Benjamin Harrison, Indiana. Currently he is assigned to M.I.T. as a graduate student in physics.

2/Lt. **Robert F. Foley,** a student aviator in the U.S. Marine Corps, is located in Pensacola, Fla. . . . **James E. Gow** is a systems analyst at State Mutual Life Assurance Co., Worcester. . . . **Alan C. Hallquist** serves as a staff scientist/mathematician at Environmental Research & Technology in Concord, Mass. . . . **Robert Hodgson** is a systems programmer at Honeywell, Billerica, Mass. . . . **Charles M. Jackson** works for Windsor Coach & Carriage, Inc., Sudbury, Mass. He handles budget problems and also helps build and restore horse-drawn carts and carriages. . . . **Alan C. Judd** is presently located in Columbia, S.C. at the GE Capacitor Division. . . . **Edward J. Kelly** serves as a field service representative for Hamilton-Standard, Windsor Locks, Conn.

Ronald R. L'Heureux is enrolled in the naval flight officer program at NASC, Pensacola, Fla. . . . Digital Equipment Corp., Maynard, Mass., has employed **Suresh Masand** as a senior engineer. . . . **Richard W. McGuire** is employed at Oliver J. McGuire & Assoc., Toms River, N.J. . . . **Richard W. Miles** works for Reed Rolled Thread Die Co., Holden, Mass. . . . 2/Lt. **David Nickless** serves as a motor officer with the U.S. Army in Ft. Sill, Oklahoma. . . . **David W. Packard** is a service engineer at Riley Stoker Corp., Worcester. . . . 2/Lt. **David O. Scott,** U.S. Army, is located at Ft. Lewis, Washington. . . . **Paul J. Scricco** is a plant engineer at Wachusett Molding Corp., West Boylston, Mass.

K. N. Setty serves as superintendent of industrial engineering at ITT Suprenant in Clinton, Mass. . . . **Hunt A. Sutherland** works at General Electric in Pittsfield, Mass. . . . **Alfred J. Swierad, Jr.,** has enrolled in the PhD program at Texas A & M University, College Station, Texas, where he also teaches computer science. . . . **Domenic V. Testa, Jr.,** is a junior engineer at Fay, Spofford & Thorndike, Boston. . . . **Anthony N. Tomasiello, Jr.,** is working for his MS degree in mathematics at Boston University. . . . **Bruce A. Webster** is currently employed by Westinghouse Electric Corp. at Bettis Atomic Power Laboratory, West Mifflin, Pa. . . . **Mark J. Whitney** works with the subcompartment analysis group at Combustion Engineering, Inc., Windsor, Conn. . . . **Richard Zarr** is an analytical chemist at Howmet Corp., Dover, N.J.

Clifford R. Harris, '96, passed away on December 3, 1974 in Walnut Creek, California. At 103 years old, he was considered to be WPI's oldest living alumnus.

Mr. Harris was born on October 12, 1871, in York, Nebraska and graduated with a BSME from WPI. His son, Joseph Harris, '27 writes: "Dad's life was really in three parts; the first part would end in 1911 when the truck accident happened at the Morgan Motor Truck Co. (Worcester) where he was superintendent; the second part would be farming to recover his health (the doctor had given him six months to live); and finally the last twenty-four years with my sister, Bessie, in Walnut Creek."

"Hink," as he was known to his friends at WPI taught pattern making in Washburn from 1899 to 1904. During his career he was also associated with Baldwin Locomotive, Standard Plunger Elevator in Worcester, American Car & Foundry and the Federal Land Bank. For many years he operated a 150-acre farm in Millbury, Mass., where he served as town moderator.

He was busy, even in retirement, avidly pursuing his hobby of turning heirloom watches into miniature grandfather clocks. Although he neither smoked or drank, he was one of the most active card players in the Walnut Creek Senior Citizens Club. While in his 90's he participated in trips to Alaska, Hawaii, and Mexico.

On the occasion of his 100th birthday, "Hink" was asked what his formula was for longevity.

"It's simple," he said. "Choose the right grandparents."

George H. Harrison, '07, died in Hyannis, Massachusetts on January 11, 1975 following a long illness. He was 88.

Mr. Harrison was the owner of Harrison Motors, Inc., Leominster from 1938 to 1968 and moved to West Yarmouth about seven years ago. He was born in Leominster on May 10, 1886, and graduated as a civil engineer from WPI.

He belonged to the Retired Men's Club of Hyannis, the Massachusetts Republican Club, and the Unitarian Church. Mr. Harrison, a third degree Mason, was also a former member of the Leominster City Council.

Howard H. Haynes, '07, passed away on January 21, 1975 in Torrington, Connecticut. He was 90.

He was born on January 18, 1885 in Sturbridge, Mass. After graduating from WPI as an electrical engineer, he worked for Price McKinlock Co., Boston. Later he worked for Hart Mfg. Co., Hartford, Conn.; Underwriters Laboratories, Connecticut Electric Mfg. Co., International Silver Co., and Remington Arms Co., all of Bridgeport, Conn. At his retirement in 1953 he was a superintendent at Connecticut Electric and Switch Manufacturing Co. in Bantam. He was a member of AIEE.

Morris H. Neal, '08, of Babylon, New York passed away on November 27, 1974 at the age of 89.

He was born on November 3, 1885 in Collinsville, Conn., and graduated from WPI as a mechanical engineer in 1908. For many years he was a special agent for the Factory Insurance Association of Hartford.

Farquhar W. Smith, '13, of San Jose, California died last July.

For many years he was a system engineer and engineering consultant at Virginia Electric & Power in Richmond. Previously he was with Blackstone Valley Gas & Electric and New England Power Co.

Mr. Smith was born in Northampton, Mass., on Sept. 7, 1888 and graduated with a BSEE from WPI in 1913. He was a member of Lambda Chi Alpha Fraternity; AIEE (chairman of Providence, R.I., section and Richmond, Va., section); Southeast Electric Exchange; Central Virginia Engineers Club and the Wood Preservers Institute. Mr. Smith, who served as an officer of the Richmond Cerebral Palsy Society, also belonged to the Masonic Order. He was a past president of the Rhode Island Chapter of the Alumni Association.

Ralph S. Ward, '18, of Lake Wales, Florida, died on February 6, 1975 at the age of 80.

He was born on May 24, 1894 in Athol, Mass. For many years, until his retirement in 1959, he was a foreman at the Union Twist Drill Co. in Athol. He belonged to Sigma Alpha Epsilon Fraternity when he was studying at WPI.

Eric S. Ericsson, '19, a former director of the Advisory Board on Vocational Education for New York State, died on October 20, 1974 in Mt. Vernon, New York. He was 78 years old.

Mr. Ericsson, who was once employed by the Domestic Vacuum Cleaner Co., Remington Co., and Combustion Engineering Co., held patents on a hand vacuum cleaner and angle-shafted screw driver. He was a supervisor with the Connecticut State Board of Education and served as a lecturer and professor at various universities. He wrote several texts on such topics as industrial training, egnineering drawing, and technical mathematics.

After studying at WPI, he graduated from New York University with a BS in education, later receiving his MA and MS from Columbia University. He belonged to Theta Chi, ASME, the New York City and Bronx YMCA Educational Boards, Phi Delta Kappa, and the Sweden Society of New York. He had served as president of the Protestant Educators' Association and New York Schoolmasters' Club; and as an officer of the John Ericsson Society.

Howard M. Estes, '20, of North Reading, Massachusetts passed away on December 15, 1974 at the age of 75.

He was born on December 13, 1899 in Windsor, Mass. After studying civil engineering at WPI, he worked until 1942 for the Consolidated Edison System. For twenty-five years he was a structural engineer with Stone & Webster Engineering Corp. in Boston.

Mr. Estes belonged to Sigma Alpha Epsilon fraternity and the Masonic Order. He was a World War I army veteran.

Stanley N. McCaslin, '21, died on December 25, 1974 in Hopedale, Massachusetts following a long illness.

He was born on August 7, 1898 in Florence, Mass. In 1921 he graduated as a mechanical engineer from WPI. For many years he was with Riley Stoker Corp., Worcester, from which he retired in 1968. Previously he worked for Crompton & Knowles, Heald Machine Co., Rice Barton Corp., Draper Corp., and Leon J. Barrett Co.

Mr. McCaslin was a member of ATO and Skull.

Albert A. Gammal, Sr., '23, passed away on December 3, 1974 in Worcester at the age of 84.

In 1960 he retired from the former Gammal Chemical Co. of Worcester. Earlier he had worked for the General Electric Co. in Lynn, Mass. He was born on January 15, 1889 in Damascus, Syria, attended WPI, and received his BSEE from M.I.T. He was a World War I veteran.

Preston W. Hale, '24, of Rochester, New Hampshire died last winter at the age of 72.

For forty years he served as a meter engineer with Consolidated Edison in New York City. He was a member of AIEE, IAEI, EEI, and AEIC. He also belonged to the Shrine in Washington, D.C.

Mr. Hall was a veteran of World War II (Signal Corps) and was born on October 1, 1902 in Winchendon, Mass.

Raymon T. Holmes, '24, died in Worcester on January 1, 1975.

He was born on May 23, 1902 in Worcester. After graduating as a mechanical engineer from WPI in 1924, he worked for New England Telephone & Telegraph Co. Later he joined M.D. Holmes & Sons Co., heating contractors, in Worcester. During the remainder of his career he was associated with Worcester Baking Co., Norton Company, and Heald Machine where he was a plant engineer.

Mr. Holmes was a member of Phi Sigma Kappa fraternity, the Masonic Order and the Worcester Economic Club.

Eugene M. Hunter '26, recognized in the power industry as a leading authority on direct-current transmission, died in Florida last August. He was 71.

In 1967 Mr. Hunter retired from the General Electric Company, Schenectady, following 42 years of service. He was manager of the high voltage DC transmission engineering section of the Electric Utility Engineering Operation and participated in the Pacific Northwest-Pacific Southwest inertie which utilizes high voltage direct-current in transmitting huge blocks of electric power over long distances.

Active in work on international standards he represented the United States at the Conference International des Grands Reseaux Electriques in Paris and the International Electrotechnical Commission held in various cities throughout the world.

A native of Portsmouth, N.H., Mr. Hunter graduated as an electrical engineer from WPI and later joined GE. In 1928 he became involved with the company's central station engineering operation. He received his MS from Union College in 1931.

A professional engineer and author of over 60 technical papers, he was also a member of the American Standards Institute, National Electrical Manufacturers Association and a member of the President's Advisory Council at WPI.

Cornelius J. Doyle, '33, of Hartford, Connecticut, died last July.

He was born on July 13, 1910 in Worcester. In 1933 he received his BSCE from WPI. From 1934 until 1966 he served as an internal revenue agent for the U.S. Internal Revenue Service in Worcester and Hartford.

Robert D. Hunter, '33, passed away on December 11, 1974 in Waterville, Maine. He was 63 years old.

A Worcester native, he graduated from WPI as a civil engineer. During his lifetime he was with the New Hampshire Highway Dept.; Ludlow (Mass.) Mfg. & Sales Co., which sent him to projects in Delaware and India; the U.S. Army Engineer Corp, with which he helped to build airfields in Assam and China during World War II; and Stone & Webster, Boston. He also worked for Albert Kahn Associates of Detroit, the U.S. Bureau of Public Roads in Concord, N.H. and Augusta, Maine. Since 1957 he was a division engineer of the Federal Highway Administration in Augusta.

During the second world war he won decorations from the American and Nationalist Chinese governments for assistance in building 64 airfields in the China-Burma-India theater. He was a retired colonel in the U.S. Army, a registered professional engineer, and also served on the Sidney, Me., town planning board and school planning committee.

Robert C. Peterson, '33, died on January 18, 1975 in South Yarmouth, Massachusetts at the age of 62.

He was a retired president of Thompson Wire Co. of Boston and a former plant manager of its Worcester branch, now Avco-Thompson steel division. A Worcester native, he graduated from WPI with a BS in mechanical engineering in 1933. He was a member of Alpha Tau Omega, the Wire Association, and Worcester Engineering Society. He served on the YMCA Athletic Club board of governers and was a former chairman of the WPI Alumni Fund Board.

George G. Gleisberg, '34, died suddenly on December 14, 1974 at his home in West Lynn, Massachusetts. He was 63.

A native of Clinton, Mass., he was born on October 12, 1911. In 1934 he received his BS in chemical engineering from WPI. He had worked for the Colonial Press Co. and Tupper Plastics Co., of Clinton; the A.S. Campbell Co. in East Boston; and for 30 years for the General Electric Co., Lynn, where he was a laboratory technician at the river works plant.

Mr. Gleisberg was a past president of the Sacred Heart Holy Name Society in Lynn and a member of the General Electric Thomson Quarter Century Club.

Edward J. Abendschein, '35, died on December 22, 1974 in Hanover, Pennsylvania at the age of 62.

He was president of New Way Packaging Machinery, Inc., and served on the boards of Hanover General Hospital, the Farmers Bank and Trust Co., and the Methodist Home for the Aged. Also, he was a past president of the Hanover Lions Club, the Chamber of Commerce, the Industrial Management Group and the United Fund.

Mr. Abendschein was born on November 8, 1912 in Niagara Falls, N.Y. In 1935 he graduated as a mechanical engineer from WPI and joined Chisholm-Ryder in Niagara Falls. He was a member of Sigma Xi and Tau Beta Pi and had served as secretary of the Western New York Chapter of the Alumni Association.

Murray W. Edinburg, '36, formerly of Worcester, died in Bryn Mawr, Pennsylvania on December 11, 1974. He was 59.

Mr. Edinburg invented and patented the first portable direct-ink-reading electro cardiograph machine. He was responsible for the development of instrument flight trainers used by Navy fighter pilots in World War II. He also researched and helped to develop the electroencephalograph and took part in the brain wave research on Dr. Albert Einstein.

During World War II he did electromedical research at Clark University. He developed devices for measuring fatigue, coordination and efficiency among personnel in the armed forces. While at McGill University, Montreal, Canada, he worked on a device which diagnosed muscular ailments, repaired muscle damage, and detected muscle disease, the research being done in conjunction with a U.S. government project.

Mr. Edinburg was born in Cambridge, Mass. on June 29, 1915. Later he studied at WPI. He was a member of the board of directors of Beth Israel Congregation and was chairman of the building fund of Beth Israel.

John V. Delany, '38, died on March 8, 1975 in Worcester. He was 61.

For 28 years he was with the Lodding Engineering Corp., Auburn, Mass., where he was marketing products manager, a position he had held since his promotion in January. Earlier he was manager of the internal sales department.

Mr. Delany was born on January 27, 1914 in Newburgh, N.Y. In 1938 he graduated as a mechanical engineer from WPI. He was a member and former president of the South Worcester Kiwanis Club and also belonged to the Worcester Power Squadron, and Alpha Tau Omega fraternity.

Edward A. Stega, '42, died on February 16, 1975 in De Land, Florida. He was 56.

A native of Worcester, he was born on May 8, 1918 and graduated with a BSEE from WPI in 1942. He retired last year as an electronics engineer for the Army Satellite Command Agency at Ft. Monmouth, N.J. after 33 years of service. He belonged to the American Association of Retired Persons.

Walter E. Kaskan, '43, died on January 23, 1975 in Binghamton, New York. He was 53.

A native of Worcester, he was born on March 2, 1921 and graduated as a chemist from WPI in 1943. In 1949 he received his PHD from the University of Rochester. From 1950 until 1965 he was with General Electric Co. in Schenectady, N.Y. where he was a research associate. At the time of his death he was a professor of chemistry at the State University of New York at Binghamton.

Dr. Kaskan was a member of Sigma Xi, Tau Beta Pi, ACS, the American Physical Society, and the Combustion Institute.

Owen Ott, '51, of Brookfield Center, Connecticut, passed away on May 23, 1974 at the age of 43.

He was born in New York City on July 23, 1930. After graduating as a physicist from WPI, he joined Electro-Mechanical Research, Inc., in Ridgefield, Conn., as a research engineer. Later he was with Boeing Airplane Co., Data Control Systems, Inc., and Data Interface, Inc., Brookfield Center where he served as president.

Mr. Ott, who belonged to Sigma Phi Epsilon Fraternity and IRI, was a member of the Brookfield Zoning Board of Appeals.

Earle R. Weaver, '65, died at his home in Lunenburg, Massachusetts on December 22, 1974. He was 36.

He was born on October 17, 1938 in Ashland, Me. In 1965 he received his MSME from WPI. He joined the General Electric Co. following graduation and at the time of his death he was a senior mechanical engineer for GE in Fitchburg, Mass.

Mr. Weaver was a member of ASME and a registered engineer in Maine and Massachusetts.

Marcel R. Benjamin, SIM '67, died on January 21, 1975 in Southbridge, Massachusetts.

He was born on December 29, 1923 in North Grosvenordale, Conn. In 1954 he received his AB from Clark University. For many years he was associated with American Optical Co. in Southbridge, where he had served as plant personnel administrator, college relations manager, and manager of management training and development.

Mr. Benjamin belonged to the Elks and worked for the Bishop's Fund.

Nominees for Alumni Trustee state their positions

Thomas B. Graham, '38

The best substantive contributions which trustees make, other than their presence on the Board, is via their committee activity. The Board's needs are for talent of any variety, preferably those who represent some diversification of professional effort by alumni, away from strictly engineering professions.

Tech's needs which I perceive for the next ten years are to convert The Plan to a credible and viable basis for its program. It will take considerable effort to sustain the momentum which will make this come true.

The other need which I can see, most emphatically, is money. This is not in the trite terms of keeping up with the inflationary spiral, but the college needs money in quantity from untapped sources, preferably alumni, so that the rate of tuition rise can not only be slowed, but possibly even reversed. We are currently on a course such that within five years, there will not be a student on the campus capable of paying the full tuition bill.

To repeat a formula I have used before: We have ten thousand plus alumni; if we could get one hundred dollars annually per head from the alumni, we would have a million dollars per year available to help students meet the costs of coming to the campus.

Carl W. Lewin, '39

I have loved selling, and in recent years, the teaching of selling. There are those who say that salesmen are born, not taught. True or not, training makes the salesman more effective and makes him productive sooner than if he is left to his own devices.

The above is by way of a preface to expressing a value judgement about the educational program at Worcester Tech. Market research would show the need for precisely the kind of program being offered. Worcester has created a product to fill a need. That product is an environment for teaching and learning that has as its goal the exposure of all possible elements to the awareness of those students eager to develop the ability to make the best possible judgements in our complex society.

I want to say something about the importance of privately funded schools. It seems to me that our system provides the greatest margin of advantages to the most people, and some of these advantages certainly flow from the dual system of private and public educational institutions that we maintain in this country. As a supporter of the private enterprise system, I believe our privately funded schools need to flourish along with tax-supported schools, important as the latter are acknowledged to be.

As a trustee, I would hope to be able to contribute to WPI enthusiastic support, certainly. But, more than that, as a "Salesman", I think I could sell some "prospects" in my "territory" on WPI. I am using these terms metaphorically to connote strengthening the awareness of WPI's program among a number of constituencies – prospective students and employers, being two primary examples. In addition I offer my knowledge as a builder, my experience as an elected school board member, and my perspective gained from ten years of international sales effort for an engineering and construction firm.

Arthur Smith, '33

Survival of privately endowed colleges is dependent on offering an undergraduate education that is superior in quality and unique in its preparation of the student for later life. Our alma mater, with the WPI Plan, is in a favorable position to attract students. At Tech, they can not only plan their own approach to their studies, but more importantly, perform independently on the achievement of some service or actual project, while being guided and monitored by their faculty.

I think the greater need of higher education is to find ways of developing in students the ability to organize and implement programs on their own. But, at the same time, students must acquire the fundamental knowledge needed to know how to proceed to solve problems and the ability to express themselves in both the written and oral forms of their thoughts and accomplishments.

The most encouraging aspect of activities at WPI in recent years is that the school has retained the flexibility to adjust to changing needs. This ability can permit our institution to survive by outperforming the larger and publicly controlled state institutions which of necessity become rigid and devoid of innovation. I do not believe a privately endowed school can hope to increase its endowment rapidly enough to offset cost increases and therefore inevitably falls prey to rising tuitions. It is necessary for such a school to develop a better product in order to survive the difficult days ahead.

Robert F. Stewart, '50

WPI has an excellent and unique program providing a challenge to its students. The primary need of the college at this time, however, as for all privately endowed schools, is expanding the base for financial support. With corporate support possibly approaching its limits and inflation on the rise, there is an urgent need for increasing WPI alumni support. There may be more opportunity to increase financial support through alumni activities and financially able student prospects than through corporate support expansion.

Growth, both in terms of participants and dollars, is required of the Alumni Fund. Our alumni, therefore, must help sell WPI through a better knowledge and understanding of the WPI Plan.

There is also a vital need for an improved interface between alumni and secondary schools. By promoting WPI's excellent programs and opportunities to potential students, enrollment and quality of students will be stimulated.

The basic strategy which I would propose to achieve the above goals would be:

1. To enlist the aid of Tech students in identifying and contacting top seniors in their home schools,
2. To transmit to campus visitors the good morale, pride and enthusiasm existing among its students,
3. To continually strive to strengthen and promote the WPI Plan so our alumni are able to "sell" good candidates on selecting WPI, and
4. Determine whether alumni could be helpful with their local high school counselors in the motivation and selection of top quality students.

What's happening at WPI?

Athletics
(*designates home games)

Baseball

May	2	Assumption, 3:30*
	3	Coast Guard, 1:00*
	5	Suffolk, 3:30*
	10	M.I.T., 3:30*
	16	Northeastern, 3:30*
	17	Amherst, 1:00

Track

May	3	Middlebury, 1:00
	6	Trinity, 3:30*
	9-10	Easterns, at Bowdoin
	16	New Englands, at UMass

Golf

May	8	Springfield, 1:30
	13	A.I.C., Nichols, 1:30

Tennis

May	3	R.P.I., 2:00
	7	Lowell Tech, 2:00*
	15	A.I.C., 2:00

WPI Colloquium
May 7 **"The Hydrogen Fuel Economy,"** Dr. Lawrence W. Jones of the University of Michigan, Olin 107, 4:30

Notable occasions
May 31 **Commencement,** 2:00 pm Harrington Auditorium
June 5-8 **Reunion**

Compare TI's NEW SR-51....

●Mean, variance and standard deviation. ●Automatic linear regression. ●20 programmed conversions. ●Percent and percent difference. ●Random number generator. ●3 accessible memories. And much more for only $224.95

FUNCTION	SR-51	HP-45
Log, ln	yes	yes
Trig (sin, cos, tan, Inv)	yes	yes
Hyperbolic (sinh, cosh, tanh, Inv)	yes	no
Degree-radian conversion	yes	yes
Deg/rad mode selection	yes	yes
Decimal degrees—deg-min-sec	yes	yes
Polar-rectangular conversion	yes	yes
y^x	yes	yes
e^x	yes	yes
10^x	yes	yes
x^2	yes	yes
$\sqrt{x}$	yes	yes
$\sqrt[x]{y}$	yes	no
1/x	yes	yes
x!	yes	yes
Exchange x with y	yes	yes
Metric conversion constants	13	3
% and Δ%	yes	yes
Mean and standard deviation	yes	yes
Linear regression	yes	no
Trend line analysis	yes	no
Slope and intercept	yes	no
Store and recall	yes	yes
Σ to memory	yes	yes
Product to memory	yes	yes
Random number generator	yes	no
Automatic permutation	yes	no
Preprogrammed conversions	20	7
Digits accuracy	13	10
Algebraic notation (sum of products)	yes	no
Memory (other than stack)	3	9
Fixed decimal option	yes	yes
Keys	40	35
Second function key	yes	yes
Constant mode operation	yes	no

More math power for the money. More than log and trig and hyperbolics and functions of x . . . the SR-51 has these and also has *statistical* functions... like mean, variance and standard deviation, random numbers, factorials, permutations, slope and intercept, and trend line analysis. Check the chart above—compare it. With the HP-45 or any other quality calculator. Then try it. We're sure you'll agree that the SR-51 offers extraordinary value.

See the NEW SR-51 at your campus book store or local quality department store

50A

For full information on the SR-51 send this coupon to Texas Instruments P O Box 22283, M/S 320, Dallas, Texas 75222

Name

Street

City State ZIP

ACTUAL SIZE

TEXAS INSTRUMENTS
INCORPORATED

©1975 Texas Instruments Incorporated

820168

AUGUST 1975

WPI journal

"Our Republic was never created to be a leveler of man. It was created to be a lifter, a developer of men.

"Our Republic was created to let the gifted, the energetic, and the creative rise to new heights of achievement, and to let each man find his own level on the stairway of existence.

"Our Republic was created to encourage men to meet their personal responsibilities and to shirk no public duties. That is why our people have always been concerned about the honest needs of their fellow citizens, the chief of these needs being liberty, justice, and opportunity.

"Our Republic demands that the nation be governed by the capable, the honorable, the far-seeing, the clear-seeing, and not by mediocre men. In the beginning it was so. May it be so again.

"Our Republic demands more from men than any other system in the realm of self-discipline, dependability, cooperativeness, industry, thrift, and honor. For anyone to foster class consciousness, class conflict, misrepresentation, covetousness, violence, theft, and an open defiance of established law—even when done "legally"—is to breed anarchy and tyranny.

"Our Republic was not designed to interfere with the inalienable right of its people to be masters of their own destinies.

"Our Republic was established to make men free!"

We welcome this 200th anniversary as we welcome every important milestone in our lives . . . a significant occasion for celebration, reflection and rededication.

WYMAN - GORDON

WPI journal

Vol. 78, No. 7 August 1975

3 **On the Hill**

4 **Feedback**

6 **Sports**

7 **Alumni Association**

8 **Sports**

12 **There was *another* young lady from Becker**
Alumni respond to the Limerick challenge

14 **Fire up above!**
W. Robert Powers, '37 tells what happened in the World Trade Center fire — and why, and in general what the fire dangers are in modern high-rise buildings.

22 **Reunion 1975**

28 **Your Class and Others**

30 **Completed Careers**

40 **Mr. Keen, Tracer of Missing Persons**

Editor: H. Russell Kay

Alumni Information Editor: Ruth A. Trask

Publications Committee: Walter B. Dennen, Jr., '51, *chairman;* Donald F. Berth, '57; Leonard Brzozowski, '74; Robert C. Gosling, '68; Enfried T. Larson, '22; Roger N. Perry, Jr., '45; Rev Edward I. Swanson, '45

Design: H. Russell Kay

Typography and Printing:
The House of Offset,
Somerville, Massachusetts

Address all correspondence regarding editorial content or advertising to the Editor, *WPI JOURNAL,* Worcester Polytechnic Institute, Worcester, Massachusetts 01609 (phone 617-753-1411).

The *WPI JOURNAL* is published for the Alumni Association by Worcester Polytechnic Institute. Copyright © 1975 by Worcester Polytechnic Institute; all rights reserved.

The *WPI JOURNAL* is published six times a year in August, September, October, December, February, and April. Second Class postage paid at Worcester, Massachusetts. *Postmaster-* Please send Form 3579 to Alumni Association, Worcester Polytechnic Institute, Worcester, Massachusetts 01609.

WPI ALUMNI ASSOCIATION
President: F.S. Harvey, '37

Vice President: W.A. Julian, '49
R.A. Davis, '53

Secretary-Treasurer: S.J. Hebert, '66

Past President: W.J. Bank, '46

Executive Committee Members-at-large: B. E. Hosmer, '61; L. Polizzotto '70; J.A. Palley, '46; J. L. Brown, '46

Fund Board: W.J. Charow, '49, *chairman;* L.H. White, '41; G.A. Anderson, '51; H.I. Nelson, '54; P.H. Horstmann, '55; D.J. Maguire, '66

by the editor

Time's toll . . . Boynton flagpole

After several years in a decrepit and deteriorating condition, the once-white flagpole atop Boynton Hall has been dismantled and removed. In recent years the flagpole has not been used, and its rusty appearance has been something of an eyesore. Although Boynton Hall now looks much better for the pole's absence, those of us who remember with fondness Roger Perry's magnificent photograph (at left) of the twin towers of Washburn and Boynton, echoing the college's motto "Lehr and Kunst," will mourn, if only briefly, the flagpole's passing.

Commencement: Economist asks, in 200 years, poverty or potential?

It was a hot and muggy May 31, with rain threatening all morning and afternoon, but the college's 107th Commencement Exercises came off on schedule, and the rain held off until everyone had left.

Rain was only one of the day's problems, though. The commencement speaker was Dr. Kenneth E. Boulding, an economist at the University of Colorado's Institute of Behavioral Science. The timbre of Dr. Boulding's voice evidently coincided with one of Harrington Auditorium's resonant frequencies, and as a result Dr. Boulding's address was largely unintelligible to many in the audience. That was unfortunate, because he had a lot to say.

"Basically," said Dr. Boulding, "the Bicentennial is a good excuse to look forward 200 years as we are now looking backward. The men of 1776 had an implicit 200-year vision, of filling up a great continent, empty by the standards of European technology, and a vision also of a new moral and political order. What 200-year vision can we have now, looking forward to 2175?

"1. It must be a *world vision*. The impact of science-based technology, which was latent in 1776 and exploded after 1860, is so large, so worldwide, and so destructive to traditional non-scientific societies which cannot adapt, that we are faced with the choice of one world or none.

"2. Our vision should aim for a *sustainable high-level technology*. We must become independent of the exhaustible stocks of oil, gas, and coal, and the exhaustible mines of materials. The only known sustainable technologies are low-level and poor, relying on the inefficient use of solar energy through agriculture and muscle power. A sustainable high-level technology must ultimately depend on the efficient use of solar energy applied to the recycling of materials. This is some way off; it may be postponed by developing nuclear fusion, though this is uncertain.

"3. We should aim for *political* institutions which eliminate war, protect cultural variety and individual liberty, and create a framework within which population is held constant and every child born has a fair chance of achieving its potential for a good life. This may not mean "world government" in the conventional sense, which could easily slip into world tyranny. It might mean a world of 500 states of great variety, held together in a framework of world political institutions of many kinds. We cannot predict the political inventions that may yet be made, but political inventiveness is essential, as it was in 1776.

"4. Our vision should aim for *economic* institutions that provide for variety, for a measure of individual choice, for inventiveness and responsiveness to demand, yet avoid inflation and unemployment, involuntary poverty or corrupting wealth, and preserve the sustainability of the system. Again, we cannot now predict what mix of exchange and grants, private property and public organization, will achieve this end. Neither the unrestrained market capitalism of the 19th century nor the tyrannical socialism of the 20th will do. Economic inventiveness is essential.

"5. We should aim for *religious* and *moral* institutions which meet the deep needs of human beings for larger identity, which foster compassion and a sense of community with the whole human race — past, present, and future — and which give hope of a meaning and significance to life which transcends the here and now. We must expect continuing revelation and the continuing renewal of potential. We must be sensitive both to moral criticism and to a criticism of morals, so that we do not fall into personal wrongdoing or into an insensitive and unrealistic moralism."

Dr. Boulding concluded that "the task is enormous. But we do stand in a dawn, however faint, of a better world than we have ever seen. It is a very stormy dawn. Catastrophes, perhaps greater than the human race has ever known, may lie between us and the Great Dawn. Famines, wars, environmental disasters are all too likely to lie in our path, and the probability that they will be fatal is not zero. It may be that humanity will fall back into universal, stable, and irretrievable poverty, or even that the whole evolutionary experiment in this part of the universe will fail.

"But there is a chance, large enough to bet our lives on, that we will make it across the tightrope of the next 200 years to that dream of the full realization of human potential which has always haunted the human imagination."

Journal cover wins college magazine award

The cover of last August's *WPI Journal*, a pen-and-ink drawing of a technological sphinx by Steve Tozier, '74, received an award of merit in the 1975 publications competition sponsored by the Council for the Advancement and Support of Education, a new organization formed in 1974 by the merger of the American Alumni Council and the American College Public Relations Association.

Letters policy adopted

At its spring meeting, on May 10, the Alumni Council approved the following statement of *Journal* policy regarding the publication of letters to the editor. The statement was drawn up by the Alumni Publications Committee in response to inquires regarding the publication — and non-publication — of letters.

ALUMNI PUBLICATIONS
POLICY ON LETTERS TO THE EDITOR

The *WPI Journal* is interested in attracting letters to the Editor because (1) the Letters to the Editor column should serve as a forum for interchange of alumni views on alumni or WPI matters, (2) letters are the simplest, most direct means of communication for alumni and (3) letters are a measure of alumni interest in both the *Journal* and WPI.

The *Journal* will publish letters to the Editor within the following limitations:

(1) Any letter that deals directly and on a timely basis with an article, or the issues presented in an article, published in the *Journal*.

(2) Any letter dealing directly and on a timely basis with an issue of general or special interest to the alumni.

(3) Any letter dealing directly and on a timely basis with any concern, action or policy of or relating to the Alumni Association or WPI.

(4) Any letter dealing directly with social, economic, cultural, political, historical or religious issues relating specifically to *Journal* articles or WPI activities.

The Editor of the *Journal*, under the guidance and direction of the Publications Committee, will exercise due discretion and caution in:

(1) Reviewing all letters to assure conformance to reasonable standards in style, language and presentation. He shall have the option of returning the letter to the author for changes or clarification but, in no case, shall he attempt to impose his views on the author.

(2) Selecting letters that are quantitatively and qualitatively representative of diverse views submitted in response to a specific article or issue.

(3) Deleting material to concentrate a letter on a single topic if such concentration is in the best interests of the *Journal* and its readers.

(4) Consulting with the Alumni Secretary, WPI officials, Alumni Publications Committee members and others, as necessary, to resolve special problems. After such consultation, the Editor shall have the right to decline to publish any letter deemed inappropriate.

Short takes

Editor: I endorse John Zorabedian's comments re the purposes of the *Journal*. The Liverwurst article is a good example of the WPI-relevant information he and I would urge you concentrate on. Good story.

R.H. McMahan, '50

Editor: After two sessions of "refresher" studies in planning, economics, financing, and operations of water supplies — one at IBRD Washington and the other at MIT and Harvard — I appreciate more than ever my *solid basic training* in civil engineering at WPI.

Prescott A. Stevens, '48

Editor: I generally don't read the articles unless one catches my attention. I believe that the dollars spent for this magazine could be better spent on the academic growth of WPI. I generally don't send $$ because of irrelevant dribble (sic) of this type.

R. Mandel, '71

Editor: I would like to see a more detailed coverage of the WPI Hockey Club. Perhaps your active interest would bring the sport out of the doldrums of being a "club" and into one of the ECAC competitive divisions.

Joseph F. Kieronski, '67

Editor: The new format is great. I also believe that "Completed Careers" is very well placed at the END!

W.F. Reardon, '32
Schenectady, N.Y.

Mysterious numbers

Editor: I am always curious about codes and computers. Would you tell us what lies coded in the numbers above our name (on the mailing label)?

000559301
Fred McGowan, '29
Guilford, Conn.

(Would I could tell you of the secret information revealed about you in that nine-digit number, Mr. McGowan. The unvarnished truth, however, is that it's merely an identification number which allows the computer to find your name and address record as well as other information about what fraternity you were in at WPI, and so forth. The director of alumni records and services suggests that you not try to memorize your number, because the whole computer file system is being changed and you'll soon have a new ID number — possibly with this issue of the Journal. *But in any case, the number alone doesn't mean much. —Ed.)*

Change at WPI — two responses to Marshall Kaplan's charges

two responses to Marshall Kaplan's charges

Editor: I have just finished reading, with much interest, a letter by Marshall Kaplan in the April 1975 issue of the *WPI Journal*, and it left a bad taste, one to which I must respond.

As one of the first of three graduates under the WPI Plan, in 1972, my reaction is somewhat biased. However, I shall endeavor to be as objective as possible in my remarks.

It has been my experience that the single most important aspect of my education at WPI has not been the body of knowledge with which I left, that being a very narrow field of study

known as Urban Planning, but a basic understanding of the various aspects of the learning experience and the ability to adapt to many different social and economic environments. This ability is embodied in the WPI Plan, and it is through the WPI Plan that I gained it.

Although I am unable to practice the profession of Urban Planning, because I choose to live in rural New Hampshire, far away from the nearest city or large town, thanks to a broader educational experience than those who passed before me at WPI, I am able to make a comfortable living at times. My education is not complete, in that I plan on getting an MBA within the next year, but at this point I can say that I am entirely happy with the education I received at WPI.

I would suppose that you, Mr. Kaplan, would consider me a subversive liberal, as perhaps I was while attending WPI, in that I worked for the creation of the WPI Plan. (I subverted the status quo while seeking a more humane environment from which to learn engineering, or anything else taught at WPI.) However, let me assure you that I still believe in the free-enterprise system, democracy, God, motherhood, and apple pie, as well as the necessity for engineers to obtain the very best education in their field of endeavor. There was something missing at WPI before the Plan. Call it social awareness or whatever, but you still missed it, Mr. Kaplan, and your letter aptly points out how badly it was needed when you attended WPI.

I would suggest, Mr. Kaplan, that you and everyone else stop using such derogatory jargon as "subversive liberals," because that only tends to alienate people into factions, and when that happens nothing is accomplished.

Neil C. Herring, '72
Haverhill, N.H.

Editor: If for some reason you should see fit not to print this letter, I would appreciate your forwarding it to Marshall; we spent two good years together as fraternity brothers.

Dear Marshall,

I was dismayed but not surprised to read your letter in the April issue of the *Journal*. I have found the thoughts you expressed common among other alumni who attended prior to the institution of the WPI Plan, as we did. It seems that in many cases two general ideas are usually expressed: (1) that an alumnus can barely recognize the old place on returning, and (2) that the academic excellence is being compromised.

To the first point, I must reply that the only constant is change, a worn cliche but apt. Considering the rate of change in this world it would be a sad case to return to Tech, say ten years after graduation, to find only minor changes in lectures to keep up with the pace. As a certified teacher, I urge you to investigate the changes that education at *all* age levels, both public and private, has undergone since your last contact with formal schooling; I trust you will be amazed. These "untested systems" are, already, bearing fruit to those whose motives are sincere. The educational literature is proof far beyond anything I could present. Or better yet don't just visit but involve yourself in one of the alternative educational endeavors in your area. I think you might have second thoughts about what is really "time tested".

The second point elicits a response that is more personal and much more difficult to get on paper. I believe the academic excellence of WPI is something that we, as students, built into a myth. I remember how tough those courses were and how damn many of them there were, it seemed a never-ending stream. After speaking with other engineering graduates from other places in New England and around the country in general, I have come to realize that the requirements and quality of education at Tech were totally in line with other good engineering schools, and I found it increasingly more difficult to use objectively the superlatives I had become so used to using.

I also remember 'fudging' labs, using exam files to study for examinations rather than learning the theory, and — what I consider most unfortunate — studying for grades because the pressure was on. I soon found out how meaningless the grades were after being employed in a responsible position. Finally, I remember that we really thought that our big cousin in Cambridge was superior to the school we attended and how depressing it was to think how hard we were working and how WPI's academic reputation was always second to that other Tech. WPI has moved, finally, out from rating second, as I see it. As Gary Davis so aptly put it — engineers are people. I knew that when I was at Tech; I was too busy to do anything about it. A school where curiosity and inquiries are stifled in any field is not a school but a factory. Don't confuse liberalism with nurturing curiosity. There are no "liberal arts type people." There are, as there always have been, two types of college students — "serious, questioning types" and "screw-off types." I believe the Plan will do much for both of these groups, by encouraging and possibly initiating curiosity, and by helping those not interested to find other outlets for their creative energy.

I agree that broadening limitlessly the scope of a small private college can be suicide in these days of tight money. I think the answer lies in enforcing the ties with other area colleges to fill in the gaps and limit duplicated effort. After meeting Dr. Hazzard, I am confident that if a solution to the dilemma is possible, it will be found. When was the last time you saw a newborn baby win a 100-yard dash?

Neil Glickstein, '69
San Francisco, Calif.

The nuclear debate — Some factual corrections

Editor: As a WPI alumnus with 33 years experience in the field of nuclear reactor design, engineering and evaluation, I was somewhat appalled to read the familiar anti-nuclear refrain in the April 1975 issue of the Journal. Neither of the letters from our overseas alumni, Messrs. Baker and Rollins, presents any material that is factually correct. Without attempting to refute all of the statements made, I would like to answer a few points from both letters as follows.

In regard to the question of reactor safety, the statement "of early AEC reports that a single nuclear accident could well result in 45,000 fatalities, etc." apparently refers to AEC Report WASH 740, issued 18 years ago. The quote is incorrect! WASH 740, actually stated that "the theoretical estimates indicated that personal damage might range from a lower limit of *none* injured or killed to an upper limit in the worst case of about 3400 killed and about 43,000 injured." Since WASH 740 was not really an accident analysis and did not attempt to quantify the potential accident, the AEC contracted for a more complete study several years ago under the direction of Dr. Rasmussen of MIT. This study, costing about $3 million, was completed in August 1974 and published in a 3500 page report. The probabilistic approach used arrived at the following set of values for a single reactor operating for 1 year:

Accident Probability	*Accident Consequence*
1 in 150,000	10 or more deaths
1 in 2,000,000	100 or more deaths
1 in 100,000,000	1200 or more deaths
1 in 1,000,000,000	2300 or more deaths

Thus the statement that there would be one chance in 33 of a *major* accident occurring over the 30 year life of 1000 reactors does not correctly reflect the results of the Rasmussen study.

As for the Price-Anderson Act which is aimed at protecting the public against these remote probabilities, so far the cost to the taxpayers has been essentially zero. In view of the unlikelihood of any future payoff the Price-Anderson Act is the last thing we taxpayers should be worrying about!

In Rollin's letter, the implication is that somehow the population will be harmed by routine releases of radioactivity from nuclear power plants. Since the estimated total man-rem dose from nuclear plants over the next 30 years will be 0.001 times that received from medical diagnosis and dental x-rays, I find it difficult to be concerned.

As for the "pittance" in R&D funds handed to the so-called "non-polluting" energy sources — geothermal, wind, tide, and solar — ERDA's budget for these areas amounts to more than $100 million for FY 1975 and FY 1976.

Contrary to what he believes, Alumnus Baker might be interested to know that the majority of those who worked on WASH 740 18 years ago are still employed by the AEC (ERDA).

My final point is that the majority of the steam electric generating plants in the U.S. operate at steam pressures between 1800 psi-3500 psi rather than at 200-300 psi as stated by Mr. Rollins.

J.A. Lane, '36
Oak Ridge, Tenn.

How wide the gap before disaster?

Editor: The cost to educate a Massachusetts resident in an independent or tax-supported college or university in this state is surprisingly close. The combined expenditures per student for 1975 are estimated as follows:

University of Massachusetts (includes Medical School)	$7,514
Private Independent Colleges	$4,590
State Colleges	$4,228
Community Colleges	$4,326

But the cost to the students for this education differs radically. Here at WPI, for instance, our students paid a tuition of $2,900 last year while at a college in the public system they paid a mere $300. Our students are paying ten times more, or $12,000 over four years at WPI.

The reason for this incredible gap is no mystery. WPI as an independent institution must each year raise the bulk of its funds (except for some federally funded programs, mostly in research) from private sources: from its students through tuition, and from alumni and other friends through their gifts. Students must bear a large portion of the cost through tuition. Colleges and universities in the state system are funded by the Commonwealth. The more students they register, the more money they get — automatically. Every student at a tax-supported school receives a large but hidden scholarship from the taxpayer. More remarkable still, this support is provided whether the student needs it or not.

Massachusetts policy provides support for higher education to students *only* if they go to a tax-supported school whether the help is needed or not. If they go to an independent college, students are on their own.

This policy has had three predictable results. It has provided students access to higher education only in state colleges and universities. It has stimulated the flow of larger numbers of students to tax-supported institutions. Since the budget of these colleges and universities is based on enrollment, this policy has led to the proliferation of new programs to attract more students. However, there has been no overall planning or coordination between the independent and public sectors. Programs are constantly being developed in the state system that duplicate those in the private sector.

As long as the demand for college exceeded available places for students, this way of running things didn't upset enough people to raise a real controversy. But as birth rates dropped and inflation soared, the pressure for college space lessened, with the result that fewer and fewer students could afford to go to independent schools. This now became a decision based on financial considerations, not on what program or college might best suit their needs.

In the meantime the tuition gap between the public and private sectors has widened. The question now is: How wide the gap before disaster strikes? Present policy, if allowed to continue, will push many if not most of our independent colleges and universities right out of existence. If that happens, it will have been brought about with taxpayers' dollars.

To prevent this from happening, what can and should be done? The first step was taken when the voters of Massachusetts last November adopted an amendment to the Constitution removing the prohibition of state aid to private institutions of higher education.

Of the many proposals submitted, the Massachusetts Taxpayers Association has argued that tuitions at tax-supported institutions should be increased to bring them closer to their true spending. They recognize that many students would need financial help to attend college and propose a state fund to meet this need. The taxpayers argue more of the cost of education would be met by the beneficiary.

An alternative way to avoid the threat of state control over all higher education would be to adopt a program similar to the New York State Tuition Assistance Plan. Under it, students residing in that state may get a tuition grant as large as $1500. They can use it at any school of their choice within New York State, provided they qualify for admission. This has reduced the tuition gap between the public and private sectors.

The advantages of a New York State Tuition Assistance Plan are many. It eliminates the control question, because the funds are directed to the student. It provides all students with considerable access and choice in selecting a college within their state. Unfortunately, because TAP funds cannot be taken out of New York State, the program has reduced the flow of New York students to independent colleges and universities in Massachusetts, exacerbating their financial plight.

A proposal free of the drawbacks of most would be a system of educational "contracting." Under it, the Commonwealth of Massachusetts would contract out specific educational tasks based on needs. It would pay for these tasks in the way it pays for all its other contracts for goods or services. Let's assume the Commonwealth finds there is a need for 300 more engineers in certain fields. It could come to WPI and ask us to educate, say, 100 of these engineers. If we had the space available we might enter into a contract with the state. Such contracting isn't unprecedented: Boston University, Tufts, and Northeastern are educating physical therapists on contract right now.

The financial benefits of contracting are many: it would free the Commonwealth from creating ever-new educational programs and facilities; it would use those which already exist at independent colleges and universities; it would save the taxpayer money; and it would preserve the independent college and university, which has been such an inestimable cultural asset of our Commonwealth for over three hundred years.

This combined approach of contracting and student support would use and preserve what we have. It would save money for taxpayers and provide greater opportunity to all students.

Whatever the answer to the plight of the independent institutions of higher education in our Commonwealth, public policy and philosophy should be changed to: provide all our students with the greatest possible access in choosing the college or university which best meets their needs and interests; allow independent and tax-supported institutions to compete with equal ability for students; preserve the priceless heritage of our independent colleges and universities.

The gap is wide and time is running out, but it can be closed before disaster.

Thomas J. Denney
Vice-President for
University Relations
WPI

Three alumni named Trustees: Lewin, Smith, Graham

Three alumni were elected term trustees at WPI last spring. They will each serve for five years on the Board.

Carl W. Lewin, '39, is vice president for international sales development at the Austin Company. He joined Austin as a field engineer in 1940 and became a project planner in the Chicago district in 1942 with responsibility for the sale of projects for Sinclair Refining Co., A.B. Dick Co., Rand McNally and others. In 1965 he was named vice president and general sales manager of Austin's international operations and was given responsibility for coordination of sales activities of the firm's overseas subsidiaries. He was appointed president of the International Division of Austin Company in 1972. Currently he is corporate vice president and is responsible for promotion of sales for Austin's international companies.

Mr. Lewin is a member of the American Society of Civil Engineers and the American Management Association. He is past president of the Board of Education in Palatine, Illinois. Twice he served as United Fund Drive chairman in Palatine. A member of the Northwest Council, BSA, he was awarded the Silver Beaver, the top adult honor awarded by the council of the Boy Scouts of America.

Arthur E. Smith, '33 former chairman of the board of United Aircraft Corporation, is retired. He joined the Pratt and Whitney Division of UAC as a test engineer in 1935, becoming a project engineer in 1938 and chief engineer of the Missouri plant in 1942. He was named assistant engineering manager in 1952 and engineering manager in 1956. In 1967 he was appointed president of Pratt and Whitney and executive vice president of the United Aircraft Corporation that same year. Promoted to

director of UAC in 1968, he served as its president and chief administrative officer until 1971. He was executive committee chairman in 1971-1972 and operated as chairman of the board from 1972 until 1974.

Mr. Smith is a member of the Society for Automotive Engineers and a former member of the Committee for Development of Supersonic Transport. He was trustee of the Manchester Memorial Hospital and a term trustee at RPI from 1969 until 1973. Formerly he served as a member of the Manchester Redevelopment Agency and as director of the Hartford Fire Insurance Co. Presently he is director of Travelers Card, the Savings Bank of Manchester, and United Aircraft Corporation of Canada.

In 1969 he received an honorary doctor of engineering from WPI and the Robert H. Goddard Award in 1967. His son, David, graduated from WPI in 1961.

Thomas B. Graham, '38, is a lawyer. He was a former technical assistant to patent counsel at Allied Chemical and Dye Corporation in New York from 1940 to 1942. He served as patent adviser to the director of the Naval Reasearch Laboratory from 1943 to 1946 in the U. S. Navy in the office of the Judge Advocate General. He was assistant patent counsel from 1946 to 1950 with the Pure Oil Company in Chicago and from 1950 to 1955 was an associate member of a large firm in New York City. From 1956 until 1959 he operated his own law office, later becoming a partner in a large New York firm from 1959 until 1965. He reopened his own office in 1965.

Mr. Graham, who received his J.D. degree from Georgetown University, is a member of the bar in the District of Columbia, Illinois, and New York, is admitted to practice before the U.S. Patent Office, various federal courts, and the U.S. Supreme Court. Since 1957 he has been an adjunct professor of law of industrial and technological property at the Polytechnic Institute of Brooklyn. He is a member of the American Bar Association Patent-Trademark-Copyright Section, the Anti-Trust Section, and has served on various committees and continuously as a member of the Chemical Practice Committee. He is also a member of the International Union of Pure and Applied Chemistry and the Patent and Trademark Institute of Canada. He is active in the Scarsdale Town Club and started a Boy Scout troop at his church.

He is past president of the New York Chapter of the WPI Alumni association and former member of the Alumni Council, Alumni Fund Board, and Committee on New Students. He has served as a WPI alumni trustee since 1970.

Carl W. Levin

Arthur E. Smith

Thomas B. Graham

Fran Harvey '37 elected Association president

New Officers for the Alumni Association for the coming year are:

President: Francis S. Harvey, '37 president and treasurer of Harvey & Tracy, Worcester, Ma.

Vice President: Richard A. Davis, '53, president of King-Seeley Thermos Co., Thermos Division, Norwich, Ct.

At large: Julius A. Palley, '46, co-owner of Commonwealth Stationers, Worcester Ma. John Lott Brown, '46 director of the Center for Visual Science of the University of Rochester, NY.

Past President: Walter J. Bank, '46 marketing manager for Systems Consultants, Washington, D.C.

Alan Briggs, '76, is named WPI's first All-America in track

The temperature at Sacramento (California) State College was 102 degrees when the race started. One mile and exactly 4 minutes and 15.0 seconds later, Alan Briggs crossed the finish line in seventh place at the NCAA Division II National Track Championships held May 31. As one of the top eight, Briggs was named All-America in track, the first WPI student to be so honored. Briggs' time was just 5½ seconds off the winning pace of 4:09.5. (The two top-seeded runners in the event finished 11th and 12th . . . in a twelve-man field.) For more about Briggs, read the next story about

A grand and glorious track season!

If WPI coach Merl Norcross had his choice of days to live over again, May 6, 1975, would certainly be one of them. On that particular Tuesday, his track team came through with flying colors. In defeating Trinity College 102 to 52, the team presented Norcross with his 100th track victory and rang down the curtain on WPI's first-ever undefeated and untied season. (In 1963 the track team was undefeated but tied.)

During the season, three new school records were set and one other tied. Alan Briggs, '76, ran the mile in 4 minutes 10 seconds. Team captain Jeffrey Wnek, '75, ran the three-mile event in 14 minutes 40.7 seconds, while co-captain Robert Donle, '75, achieved a triple jump of 46 feet 7½ inches. Gary Pearson, '77, tied the 13 foot pole-vault record.

In recognition of their outstanding achievements, the Poly Club presented each member of the squad with a plaque featuring a color photograph of the team, the season, the record, and the names of the team members. The Alumni Association also gave each member a citation.

The team posted impressive wins over city rivals Worcester State, Clark, and Assumption, then went on to defeat northern circuit opponents Colby, Middlebury, and Norwich as well as the strong teams of M.I.T. and Tufts.

In the city meet it was WPI's overall depth that did the trick, with eight first-place finishes.

Over JP weekend, WPI trounced Colby and Norwich — this time with eleven firsts. Gary Pearson topped the day with a pole vault of 13 feet 6 inches, but because of wind conditions his jump was disqualified. Against M.I.T., the WPI track men won 89 to 65. Four days later, Donle set his triple jump record against Tufts. Then, at the Easterns, held at Bowdoin in May, Briggs set his mile mark.

Coach Norcross attributes the outstanding season to "the overall team balance and depth, which insured repeated victories all season." One important factor in the strength of this year's team was in the efforts of three outstanding performers who were second-generation WPI students — and whose

forebears at WPI were also prominent in the sports scene.

Jon Hatch, '75, a four-year letterman in track and a consistent winner in the 100-yard dash, wanted desperately to break the school record in the 220 — which his father, Edwin Hatch, '37 had set back in 1935. Jon didn't make it, though, and the senior Hatch's record of 21.6 seconds still stands.

Richard Brandoli, '76, once held the WPI record for javelin (at 195 feet 11 inches) and also throws the hammer. His father, Raymond A. Brandoli, '49, played football at Tech while his uncle, Harvey Vigneault, '49, was active in interfraternity sports.

Alan Briggs, '76, comes from a long line of WPI athletes. One brother, Oliver, '70, was captain of the basketball team while another, Douglas, played football. His uncle, Henry Dumas, '56, was a baseball player. Briggs' grandfather, Charles D. Briggs, was a member of the Class of 1913. Briggs has served as co-captain of the cross country team and was a sports writer and editor for *Newspeak*.He has been elected co-captain of next year's team.

"This year Al broke the record in the mile," reports a smiling Norcross. "When he was at Wachusett Regional, he was the Knights of Columbus Road Race Champion and Class B state mile champion. With talent like that — plus the seniors' four-year record of 40 wins and 7 losses, how could we lose?"

Team talent, certainly, is a prerequisite for a championship season. So too is superior coaching, and Merl Norcross provided plenty of that. Speaking about him, Prof. Robert Pritchard, head of the department of physical education and athletics, says, "Merl's outstanding success this year comes as no surprise to those who work with him daily. He is devoted to working with the track team, and no squad member could ask for any more dedication than he gives. I know that his quiet, consistent recruiting of qualified high-school track men, done almost exclusively by letter-writing and phone calls, is paying off. Further, Merl's position on the NCAA Track and Field Rules Committee has earned him recognition in the collegiate world and brings great credit to WPI. He richly deserves this moment of triumph."

In turn, Norcross credits the efforts of others who contributed to the winning season, citing Prof. James Herrion, his assistant coach, and Dean John van Alstyne and professors Allen Hoffman, '63, Hal Corey, Tom Keil, Bill Miller, and Bob Pritchard, who served as officials. Managers of the undefeated team were Ron Matthews, '75; Tina Tuttle, '78; Carol Sigel, '77; Cynthia Gryniuk, '78; and Steve D'Alssandro, '78.

Merl Norcross arrived at WPI in 1952 as a physical education instructor after graudating from the University of North Carolina with an AB and a master's degree in education. He had been a member of the 1948 Sugar Bowl team, the 1949 Cotton Bowl Team, and had run on two Southern Conference championship track teams. In 1957 he was promoted to assistant professor at WPI, and since 1967 has been associate professor of physical education and athletics. He belongs to the U.S. Track Coaches Association and the New England Football Coaches Association. In 1973 he was appointed a member of the previously mentioned NCAA rules committee. He is currently chairman of the Division II Track and Field Committee, which runs the national championships. Professionally speaking, he knows his stuff!

Only two school track records have not yet been beaten or tied by WPI athletes coached by Merl Norcross in the past 23 years — the 220 by Hatch, '37, and the long jump by Al Deloid, '49, are still standing. This year he coached the WPI track team to that rare achievement — the first unbeaten, untied, season in the school's history. His record speaks for itself.

Alan Briggs winning the mile run against Trinity. You might just be able to make out the second-place finisher—he's just rounding the turn.

Now on record!

The WPI Glee Club in England, 1975

Louis Curran, conductor

You're in for a real treat when you listen to this recording made during the Glee Club's 1975 tour of England. The stereo recording was made in Trinity Cathedral, with the following program:

Missa Salve Regina, by Jean Langlais, recorded in antiphonal stereo with double quartet of brass, two organs, and the men's choir
Crucifixus, by Antonio Lotti
Chantes a Dieu, by Jan Pieterson Sweelink
Ain'ta that Good News, arr. Dawson
Sister Mary Wore Three Lengths of Chain, arr. Bartholomew
College Songs, featuring The Baker's Dozen

This magnificent recording is available for $4.50 plus mailing charges from
The Humanities Department
Worcester Polytechnic Institute
Worcester, Massachusetts 01609

There was *another* young lady from Becker . . .

or, The alumni get their revenge on WPI

In the February issue we printed the more printable results of an on-campus limerick contest. We followed that with a challenge to alumni to see what they could produce, holding out the inducement of a beer on the house for each published specimen. While the response was not overwhelming, the quality was high and those who sent in entries certainly put in a lot of time and effort. It would appear that the grand prize for effort belongs to Phil Pierce, '31, who sent in six (count em, six) limericks!

Evidently the limerick-writing process is just not that easy. Three entrants chose to comment on the difficulties and the quality of the finished product:

With limericks I am not a master;
This rhyme, no doubt, 's a disaster.
But I could care less
'Bout poetic finesse;
It's free beer at the Pub that I'm after.

—John E. D'Amico, '74

There once was an incredible bunch
Who came up with a ridiculous hunch:
They each wrote a rhyme
For the very first time
And made me regurgitate lunch.

—C. Chapin Cutler, '37

There once was a Pub on the Hill
Where students at bay drank their fill.
They all tried to write rhymes
And failed time after time;
Better work comes from graduates still.

John P. Hyde, '45

The next most popular topic was the famous (infamous?) WPI Plan:

Said a peddler by name of John Boynt,
While towards this great Hill he did poynt:
"Hey, let's build a school
Where any damn fool
Can get a degree from the joynt!"

—Alex C. Papianou, '57

There once was a grumpy alum
Addicted to cola and rum,
Resulting in letters
Insulting his betters
Who'd *Planned* for the future to come.

—anonymous

At a school on a Hill in Worcester
Proffed by graybeards and 8 or 10 roosters,
They devised a great Plan
First espoused by Grogan
And turned many more grads into boosters.

— Bill Bushell, '37

The problems of women came in for some attention:

There was a young lady from Becker
Who lived in a high-rise three-decker.
She ran up the stairs
Which started her cares,
But the rooms had all gone with the wrecker.

—Herbert Neuman, '36

There was a young woman of Tech
Who decided to stick out her neck.
"An alumna am I,"
She said with a sigh,
"But they never bother to check."

—Allison Huse Nunn, '73

On other subjects:

The swordfish are gone and forgotten.
For us the job market was rotten.
To become bigger fools
We all went to grad schools,
And now we mine coal and pick cotton.

—R.A., '71

Mention limericks and I rise to the bait.
No somber sonnets do I wish to relate.
When the subject is Poly,
My sentiment: "How jolly!"
Her praises on paper I'll state.

—Phil Pierce, '31

And finally, in case you sent in a limerick which doesn't appear here, Phil Pierce has the last word on that:

A limerick requires no great style;
Just let your thoughts idle a while.
Send the results to R.K.
And when he's had his way,
"No good, sorry," he'll say with a smile.

WPI

Fire

up above!

The movie Towering Inferno *was still playing to packed houses. Along with other 'disaster' pictures, it had sharpened the public's uneasy awareness of danger from catastrophic events.*

And then the nation was stunned when it learned, on the morning of Friday, February 14, 1975, that fire had broken out in the World Trade Center, New York City's tallest building, the second-highest in the world.

That fire was not the tragedy envisioned by Hollywood. No lives were lost, and the building was not seriously damaged. But the question remains:

Could life imitate art?

Could Towering Inferno *really happen?*

One of the people best able to answer that question is W. Robert Powers, '37, superintendent of the New York Board of Fire Underwriters, one of the nation's leading authorities on fires in high-rise buildings. Powers was in charge of the Board's investigation of the World Trade Center fire, and his findings pinpoint the problems of making and keeping such buildings safe for people to live and work in.

. . . think of this article the next time you're waiting to see someone on the 43rd floor.

THE EARLY MORNING NEWS reports set the minds of all fire buffs in the New York metropolitan area to feverish activity. Fire was reported from the 9th to the 19th floor in the North Tower of the World Trade Center. The possible consquences and solutions radiated throughout the area. Suppose 6,000 people have to go to the roof, with flames licking up the stairs, elevators, and windows. How can they be rescued? The French tightrope walker showed how easy it was to do this. Get a bow and arrow and shoot a fishing line from the South Tower to the North Tower. Pull a heavier line and then a steel cable between the two roofs. A breeches buoy then could make a round trip every minute carrying one of the trapped occupants to safety. **Every minute!!** With 6,000 people waiting, that would take 100 hours, or over four days. The last survivors would be dead of starvation or dehydration if they managed to survive the advancing flames.

There must be a better way

The most commonplace solution that flashed through people's minds to rescue the imagined trapped 6,000 was by means of helicopters. A phone call to New York Airways would bring two of their 30-passenger helicopters to pick the people off the roof and deposit them safely at Battery Park only a few blocks away. Since a copter could make the round trip in five minutes, two of them could save 720 people per hour. The whole 6,000 could be moved in 8½ hours . . . which is a long time when flames are singeing your feet. Besides, this plan ignored the TV transmission antenna being erected on the roof, the winds that always blow at the 110th story, and the danger of engine failure because of smoke and heat.

There must be an even better way

Fortunately there were no trapped occupants on the roof during this fire, and there certainly is a better way to safeguard the tenants. A study of the fire and of the World Trade tower buildings is necessary to comprehend that better way.

ABOUT 11:35 p.m. on Thursday, February 13, 1975, a porter finished his chores on the 12th floor and took the elevator to the 11th. After working about ten minutes, he heard a crackling sound and saw flames under the door leading to the R.J. Saunders' office. He turned in the fire alarm to the World Trade Center Police. The city fire department was called, three policemen with a fire-equipment cart went to the fire floor, and the engineer was prepared to put the air conditioning into its purge mode. One minute after the manual alarm was received, the smoke detector in the air conditioning plenum at the southeast corner of the 11th floor operated. Smoke detectors on the 12th to 19th floors, except for the 15th, operated successively at about one-minute intervals. In the meantime the police, wearing air packs, reached the 11th floor and found the door to the Saunders' office too hot to open. They used a standpipe hose from a nearby stairway to try to cool the door. They reported via walkie-talkie of the serious fire, and the air conditioning was placed into the purge mode. This meant that fresh air was being blown into the core area to keep it free of smoke, and air was being drawn out of all the tenant areas to prevent smoke from spreading throughout the building. The fire department arrived promptly and spread hose lines to bring the 11th floor fire under control.

This was a hot and stubborn fire to extinguish. It was not recognized immediately that fire had spread to other floors, but a search disclosed that fire from telephone closets on the 12th and 13th floors was igniting files in these office areas. This discovery caused the fire department to order evacuation of all cleaning and service personnel in the building. Further search showed that the fire had extended to telephone closets on the 9th through 19th floors. These fires were readily extinguished. The fire involved about 9,000 square feet of the 11th floor, destroying about half the contents and damaging the remainder. It completely burned out telephone panels and wiring on three floors and caused severe damage in eight others. Four steel bar trusses were distorted slightly.

During a fire, it is extremely difficult to determine details on causes and effects. The prime consideration is to put the fire out. As soon as the smoke had cleared, though, and for many days later, a detailed study was made to determine the origin and reasons for the spread of the fire.

R.J. Saunders occupied the southeast corner of the 11th floor of the North Tower, also known as Tower A or 1 World Trade Center. On the day of the fire, the last Saunders employee left the office about 9:30 p.m., and the cleaning woman left about 10:30 p.m. Both reported conditions normal when they left. The cleaning woman does not smoke. It is believed that the fire originated in the executive offices from some unknown source at about 11:30 p.m. Overstuffed furniture burned fiercely and the fire spread south and west along corridors toward the open office area. The fire entered the file room where numerous records were stored on narrow shelves, some with steel shutters. Unfortunately, all of the shutters were open. A gallon of methyl-alcohol duplicating fluid in this room was set aflame by the heat.

It appears that a flashover occurred just as the Port Authority policemen reached the office door, driving the fire out of the office it started in and breaking seven windows in the east wall. Fresh air to fan the fire entered the 11th floor through these broken windows. The outer skin of the building suffered no smoke or heat damage because the airflow was inward. Fire also spread through the horizontal channel in the peripheral heat diffuser units to adjoining offices. At about the same time the windows broke, the air conditioning was placed in the purge mode and exhaust fans pulled air into the plenum to the return air duct at the southeast corner of the core. The air conditioning is not operated at night so there was no movement of air in the system prior to the purge.

Telephone cables in the plenum were ignited by the fire. Because of openings around the cables and louvers in the telephone closet door, fire penetrated the closet to ignite telephone panel blocks and cables. Fire spread to upper and lower levels through openings in the floors of these closets. Cables passed vertically through the openings, but no fire-stopping was provided for spaces around the cables. The polyethylene and polyvinyl-chloride cable insulation and plastic panel blocks burned readily so that virtually everything that could burn, including the fire-retarded wood paneling on the telephone closet walls of the 10th and 12th floors, was destroyed. Fire emerged from the telephone closets on the 12th and 13th floors in the same manner it entered on the 11th floor. Fortunately, there were relatively small amounts of combustibles near the closet doors on these floors so that the fire department had no trouble controlling these blazes.

Meanwhile, back on the 11th floor, smoke and fire gases were being kept out of the southeast quadrant by a

one-hour fire partition that subdivided the floor area in accordance with New York City's Local Law No. 5. Some heated gas was being drawn around the core to the northeast and northwest return air outlets, but closing of protective dampers now caused all the fire gases to flow to the north end of the building. Eventually a fusible link on the northeast shaft melted, closing a shutter, but it is believed that the fire was under control at this point. However, high temperatures in the plenum radiated enough heat into the offices north of the fire to melt plastic phones and char papers on desk tops . . . but ignition did not take place.

CONSIDERABLE DISCUSSION ensued after this fire regarding its effect on occupants had it occured during working hours. It also raised the question as to whether more fires could take place which could threaten the thousands of people located throughout the 110 floors. The World Trade Center is unique in many respects, but it has sufficient points in common with all high-rise office buildings that its story is applicable everywhere.

The twin towers of the World Trade Center, each 209 feet square and 1,350 feet tall, rise above a five-acre open plaza. There will eventually be four low-rise buildings surrounding this plaza to complete the project.

While the casual outsider sees two towers stretching skyward, a closer look would show that each building is divided into three vertical sections about 32 stories high by the mechanical equipment rooms. Tenants would consider the building to be three units because of the sky lobbies where they transfer from express to local elevators. Elevator engineers might consider each tower to be a series of seven- and eight-story buildings because this is the number of floors served by individual elevator banks. None of these concepts is correct, however, because of overlapping of the various supposed zones.

Sky lobbies are located at the 44th and 78th floor levels. Express elevators carry passengers to either sky lobby, which functions the same as the ground-floor lobby. There are four banks of elevators for each segment serving six or seven floors and having no openings into other floors. This is an important feature because evacuation during a fire could be carried out by the use of all elevators except for the bank that has openings to the fire floor. There is one elevator which stops at all floors, and it is set aside for fire department use during an emergency. The air-conditioning system actually divides the building into four vertical sections. Fan rooms on the 7th, 41st, 75th, and 108th floors provide air conditioning for floors 1-24, 25-58, 59-91, and 92-106, respectively.

The basic fire protection consists of standpipes with hose and two fire extinguishers in each of the three stair towers. Water supply for the standpipes is from 5,000 gallon tanks on four levels. Only two pumps in series are required to provide the pressure needed to reach the top of the tower.

At the time of the fire smoke detectors were being installed at the return air outlets in the four quadrants of each floor. This installation is now complete. These will sound an alarm and identify their location at the Police Desk. In addition, operation of these smoke detectors will shut down the air-conditioning system.

There is a manual fire alarm box on each floor that provides two-way communication with the Police Desk in the basement.

Some floors or sections of floors have been sprinklered, including all restaurants not under Port Authority ownership. Sprinklers have not been provided in Port Authority restaurants because the furnishings meet their special flammability standards. Hoods in all kitchens are equipped with automatic fire protection of various types.

Any discussion of the World Trade Center would be incomplete without mentioning two unique fire safety features: their limits on contents combustibility and their fire safety plan. In 1970, before the first tenants moved into the building, the Port Authority Safety Department recognized the hazard of combustible furnishings, especially foamed plastic cushioning for chairs and sofas. Specifications for flammability of furnishings were developed; they are adhered to in Port Authority and New York State Offices and are urged for use in other tenants' offices. Briefly, these recommendations ask that chairs be no more hazardous than red oak, that upholstery materials, drapes, and curtains be self-extinguishing as defined by federal specifications, and that carpets have specified low flame-spread ratings. These recommendations do not call for completely non-combustible furnishings, but they do limit the fire hazard to prevent extremely rapid combustion.

The fire safety program of the World Trade Center is excellent. It should be, since 50,000 tenant workers and 65,000 visitors each day are anticipated in this complex. There is a full time fire protection engineer and five fire safety directors, trained and certified by the New York City Fire Department, for the Center during the day. At night there are two fire safety directors. Their duty is to control fire-fighting, notify tenants of conditions, and

guide evacuation until the fire department takes control. In addition, there is an initial fire brigade of three trained policemen to respond immediately to each alarm with a fire-fighting cart containing extinguishers, air packs, resuscitators, and first aid kit. Communication between units is maintained by walkie-talkies carried by all of these men and furnished to the fire department on arrival. This is not just a paper organization — fire drills are held every three months with every tenant and its wardens participating. Once each year informatory sessions are held to update tenants on the latest fire-prevention information. Of prime importance are fire drills held monthly (on Sundays) by the New York City Fire Department. The same crews are not brought in every time, but second and third alarm companies in remote locations also drill in case they must respond to the Center.

One important factor to be aware of is New York City's Local Law No. 5, Fire Safety in High-Rise Buildings. This law, generally speaking, gives a building owner the option of installing automatic sprinklers or providing a series of other alternatives.

1. The law requires large floor areas to be subdivided into compartments of no more than 7,500 square feet by one-hour fire partitions. Where a tenant wants a large open area, the entire floor is sprinklered.
2. The law requires that stairs be pressurized or an automatic smoke-evacuation system provided.
3. Smoke detectors must be provided on each floor at each return air shaft.
4. There must be a manual fire alarm and communication system that provides two-way communications with the fire wardens on every floor and a public-address system to communicate with the tenants on one floor or any series of floors.
5. The law requires smoke detectors in all elevator lobbies to send elevators to the ground floor or sky lobby on actuation.
6. It is required that interlocks on elevators be wired with high-temperature wire and equipped with a fireman's switch that gives a fireman complete control of the elevator.
7. It is required that there be floor wardens, fire safety directors, fire-command centers, and evacuation drills with tenants.

MANY PEOPLE have asked: How safe are the two World Trade Towers? Realizing that about 65,000 people may be in one tower at any height from ground level to 1,350 feet, it is obvious that there is no margin for error. Overall, these towers may be considered among the safest buildings in New York City. There are bad points — fireproofing of the steel may be missing in places; openings have been made in floors and walls, but it must be said that the World Trade officials have reacted quickly to fire-stop these openings; fire rating of shafts is just above minimum requirements; wiring ducts under the floor (as in many other buildings) have questionable fire resistance; and construction hazards and deficiencies due to incomplete construction are still present.

However, the good points outweigh the bad:

- Limited combustibility of furnishings is a proper point to start. If tenants would support these recommendations, the chance of a serious fire would be small.
- Good vertical protection between windows and at the junction of the outer wall and floor slab.
- Non-combustible building components including thermal insulation.
- Ability to vent smoke and pressurize core.
- Automatic sprinkler protection in basements, shops, and special hazard areas.
- The presence of trained fire safety directors and police for fighting fires, as well as drills with the New York City Fire Department in case of fire.

Last and perhaps least understood is the building arrangement. The building is subdivided into many vertical components so that total involvement in fire is almost impossible. There are only three vertical shafts that travel the height of the building, and only one has openings on every floor and is designated for fire department use. The other two elevator shafts have openings only at ground floor, the sky lobbies, and in the upper third of the building. The chimney effect so often mentioned as a danger in high-rise buildings cannot be 100 stories in effect, but will be divided into four components by the action of the air-conditioning systems. None of the stairs run straight from the top to the bottom of the building. Stair towers are offset at various floors where the size of the core changes or the number of elevators serving a floor is reduced. At each of these points, horizontal passageways lead to the new shaft locations and fire doors are provided. These doors would prevent smoke from contaminating a stairway from top to bottom. The arrangement of elevators is such that they could not carry fire throughout the building, but could only be a factor in a limited number of floors.

THE NEED for a better way to save people trapped in a fire has been demonstrated. There is a better way — **Don't let it happen**. What is true of the twin towers is true of many, if not at all, high-rise office buildings and will be applicable in varying degrees. Similarly, what has been learned in other high-rise office fires in New York City will certainly be applicable to the World Trade Center.

There are over 2,000 high-rise buildings in New York City, excluding residential structures. Of this total, 805 are Manhattan office buildings. Experience has shown that about 170 fires will start in these buildings each year, and most will be of no consequence. In 151 of these office buildings that are fully sprinklered, records show that in the past six years there were 85 fires in which sprinklers came into operation. Sixty-four of these were controlled by one head, 11 fires by two heads, 6 fires by three heads, and single fires by four, five, and six heads. There was only one failure, which was caused by a shut floor valve. These fires occurred from the basement to the 34th floor.

The experience in New York City for almost 75 years shows that fires can be started from many different causes, ranging from an Air Force bomber crashing into the Empire State Building to a cigarette dropped into an over stuffed chair. Somewhere in between are the incendiary device hidden in a reception room and the welder's sparks that have been responsible for many fires. However, the list of spectacular fires In New York City for the fifty years from 1917 to 1967 is very small, and the loss of life was essentially zero in all high-rise fires in this period. The exception, of course, is the plane crash, which sprayed about 800 gallons of gasoline on two floors but still did not jeopardize the strength of the building. Not all fires have been confined to one floor: the Woolworth Building had a grease duct fire that extended from the basement to the roof of the building; the Empire State had an insulation fire that spread from the 31st to the 66th floors, and fires in elevator shafts are relatively common. There were serious and unusual fires, but they were readily controlled before reaching conflagration proportions.

However, in 1968 and early 1969, experience changed dramatically with the occurrence — only months apart — of the Time and Life Building fire that provided spectacular television shots, the Chemical Bank fire that frightened occupants because of smoke penetrating many stories, and the fire in an architect's office that killed ten occupants. The fact that this last fire was not in a high-rise building, but on the 3rd floor of a small five-story fire-resistive building, heightened the concern of New Yorkers for their safety. The fires in 1970 at 1 New York Plaza and 919 Third Avenue, where a total of five people died, showed that the safeguards of the past no longer existed. It was apparent that hazards and deficiencies do exist in high-rise office buildings, and local Law No. 5 was enacted to reduce or eliminate the danger to life.

WHAT ARE THE HAZARDS today that were not present in the fifty-year trouble free period?

1. Combustible furnishings. In order to have a fire, it is necessary to have something to burn. The all-steel office of the 20s and 30s with steel desks, steel files, steel and glass partitions, and masonry-enclosed stockrooms are becoming a thing of the past. In their place, fashion dictates the use of overstuffed chairs, wood desks, combustible "landscape" partitions, combustible carpeting, and combustible paneling or finish on the walls. The most serious aspect is that very highly flammable foamed polyurethane and foamed rubber cushioning is used, which burns at an extremely high rate and gives off flammable gases and copious smoke. Burning of this material is so rapid as to pose a threat to people in the immediate or nearby areas.

Not to be overlooked is the tremendous quantity of paper used in offices. Computer printouts use large quantities of paper and generate masses of used carbon paper. The storage of files on open racks or in cardboard cartons can turn an office into a small warehouse. Reference libraries in lawyer's offices and drawing racks in architects' offices create a severe fire-loading and have caused several serious fires.

2. Central air conditioning. The central air-conditioning system itself is not a fire hazard. It is important because it can spread smoke throughout a building, carry fire from one section to another, and intensify a fire. Smoke can carry through a system even when it is shut down and create intolerable conditions on floors other than where the fire is. The fresh air brought in by the air conditioning tends to fan a fire, and drawing the air into the plenum can spread the fire in the direction of the return air shaft. Because of this, no combustibles should be allowed in the plenum to create additional heat and more problems. This tendency for fire to travel to the return air shaft can be an advantage if the shaft is non-combustible and smoke is discharged to the outside. This will tend to prevent a build-up of pressure in the fire floor from the heated gases and lessen the spread of smoke in the building. If only a portion of a space is involved in fire, sufficient cool air will be carried along with the hot gases to moderate the temperature impact.

The popularity of air conditioning has introduced another hazard — combustible insulation in the walls. Foamed plastics are excellent insulation materials, but they are extremely flammable. Tests have shown that exposed polyurethane foam on a wall burns so rapidly it can outrun the fusing and operating of sprinkler heads. Such insulation should never be exposed in walls, shafts, or concealed spaces but should always be enclosed by a noncombustible thermal barrier.

3. Design faults. Building codes in general have requirements that will provide a reasonably fire-safe building. Tests by fire at impartial laboratories are conducted by manufacturers to prove their products meet code requirements. Unfortunately, no provision seems to be made for protection of openings in floors and walls. Consequently, some holes are not filled or others are filled with materials that disappear in the first few seconds of fire. It is ridiculous to spend time and money to prove that a floor or wall can withstand a two-hour fire and then allow holes to be cut in it that destroy the fire resistance.

There is another design fault in the creation of vertical shafts around columns in exterior walls, or in the exterior skin of the building. Such openings have allowed fire to spread from one floor to another where only flammable plastic foam served as a fire barrier to the shaft.

Another problem is the entire design of the modern light-weight building. Although the components have passed fire tests, they provide no reserve for unexpected conditions. For example, a concrete-block wall will be still standing and preventing fire spread long after its two-hour fire exposure. By contrast, many modern assemblies will disappear if fire lasts only a few minutes longer than specified test durations.

Similarly, sprayed fireproofing has successfully passed fire tests, but conditions in the field are not the same as in the laboratory. Even if the sprayed material is properly formulated and applied to the proper thickness, it may not adhere to the surface or it may be knocked off as other building services are installed. The result is that the expected fire protection is not here when it is needed.

In many discussions of protection of high rise office buildings, much has been said of the trade-offs that should be allowed where automatic sprinklers are installed. The facts of life are that the trade-offs have already been taken in the modern design of buildings. The installation of sprinklers is the best way to return building protection to the level of the past.

The only other alternative is to provide a redundancy of protection such as required by New York's Local Law No. 5, minimize the fire hazards within the building, and constantly supervise the maintenance of building protection.

4. Communication and power wiring The sheer bulk of the electrical and communications equipment in a major office creates a problem because of the number of wires and cables required to supply them. Where conduit or under-floor raceways are provided, the hazard is almost nonexistent. All that is required is fire-stopping where the cables pass under or through power or telephone closet walls. The worst and most hazardous condition is when wires and cables with combustible insulation are run through plenums to service the floor above. This provides a double hazard by introducing combustibles into the air conditioning system and by requiring openings in the floor that are not equipped with fittings or fire-stopping equivalent to the fire resistance of the floor itself. Telephone cables can carry more than messages — they can carry fire through a wall even when conventional fire stopping is provided. The mass of cables that supplies communications equipment in many offices is sufficient to sustain a substantial fire. While an individual cable is extremely difficult to ignite, a group of cables lying parallel will burn intensely, just as will a group of logs in a fireplace. A fairly recent development is the installation of telephone and communications equipment by other than the local telephone utility. The equipment is often not located in telephone closets, and it and its wiring contains considerable combustible plastics that could be a source of fire.

The contention that telephone and other communications wiring cannot create a hazard because of low voltage and low amperage is simply not borne out by experience in New York City. A substantial number of fires of electrical origin have occurred in telephone equipment in office buildings. In addition, faults of installation such as lack of fire-stopping or installation in improper locations threaten the fire safety of buildings.

5. Elevator call buttons. Finger-sensitive elevator call buttons have been responsible for calling elevators to a fire floor. If the car is occupied, its riders are subjected to the fury of the fire when the doors open. These buttons can be operated by heat, smoke, flames, and other conditions present during a fire.

6. Hazards of construction. Many fires in New York City have shown that the fire hazard of a building which is still in the process of construction, but partially occupied by permanent tenants, are serious. There is a dual control which makes it difficult to implement safety plans. There are operations and hazards that will not be there when the building is completed. Openings are left in floors for future electrical or air-conditioning equipment. Temporary elevator doors to accommodate large equipment are substandard or left open. Protection is not applied to air-conditioning ducts that pass through corridors. Openings are not fire-stopped in walls and floors. Protective coatings are removed from structural steel; and large accumulations of combustible materials or combustible packaging are usually present. Alarm devices may be only partially operable or not yet accepted by the building owner. Welding, cutting, soldering, and careless smoking can start fires.

To cope with these hazards, basic fire protection features such as stairs, elevators, alarms, and standpipes must be in service to the level of the highest tenant. Fire partitions around the tenant's space must be complete even if temporary fire-stopping is necessary until work in the area is completed. Tenants should be acquainted with evacuation procedures, location of fire-protection equipment, and most of all with information on hazards and hazardous areas to be avoided. Strict supervision must be provided to prevent operations that might endanger tenants, such as chopping holes in stair towers, welding adjacent to occupied areas, or creating smoke conditions in air-handling equipment. It is not possible to anticipate all of the hazards, but the precautions can be narrowed down to providing the tenants with totally enclosed fire-safe construction with no unprotected openings.

IN CONCLUSION, fire safety at the World Trade Towers, as in all other high-rise buildings, is what the owner and the tenants make it. The owner must provide an inherently safe building, competent personnel to maintain it, and proper supervision of hazards in the building. The tenants have the obligation to be aware of the safety features and evacuation plans and to participate in drills. They, too, have the responsibility for safeguarding hazards in their operations, and in minimizing the effects of a fire in their premises. Only this kind of cooperation can ensure that no conflagrations, such as recently occurred in Brazil, can endanger the people and the businesses in their building.

Reunion 1975

C. Marshall Dann, '35, comparing notes with Stephen J. Hebert, '66, secretary-treasurer of the Association.

President and Mrs. Hazzard welcomed members of three reunion anniversary classes — 1925, 1935, and 1950 — into Jeppson House, the president's residence; for cocktails and conversation.

At the Hazzard's reception for them, '35 class members Homer Morrison and Ray Granger meet old friends.

It was billed as the "Good Old Days Get-Together," and though a bit late in getting started, was a pleasant relaxation for those at Reunion. Music for dancing was provided by a banjo band, and the whole thing took place in "the Wedge," the new addition connecting Daniels and Morgan halls. Pretzels, peanuts, candlelight. Add something to drink, friends to talk and laugh with, spirited music for those who like to dance, and what you had was the Friday night's GODGT.

Members of the Class of 1910, back for their 65th reunion, gather around the sundial in front of Boynton Hall. The solar clock was a gift of the class when they graduated. Although the Reunion attendance cup traditionally is won by the 50th anniversary reunion class — and it was this year — 1910 came within a couple of percentage points of carrying off the trophy.

"Bud" Thayer, '24, tips his hat to one of the ladies at Reunion.

Francis S. Harvey, '37, accepts the gavel symbolizing the presidency of the Alumni Association, from Walter J. Bank, '46, who has led the Association for two years.

Carl Backstrom, '30, being given a surprise Taylor Award at Saturday's luncheon. Carl is chairman of the Citations Committee, but this was one citation he had no hand in writing!

C. Marshall Dann, '35, Goddard Award winner (and U.S. Patent Commissioner), presents President Hazzard with a check for his class's 40th anniversary gift to the Institute—over $57,000!

Herbert F. Taylor Award winners Carl Backstrom, '30; Edwin B. "Ted" Coghlin, '23; and Earl C. Hughes, '14 showing off their award certificates to WPI's president.

Goddard Award winner Sigurd ("Si") Wendin, '25, with Mrs. Robert Goddard and President George W. Hazzard.

That was Reunion '75

Coming up is a super spectacular HOMECOMING

October 18, 1975

Mark your Calendar

The data on which these class notes are based had all been received by the Alumni Association before June 1, when it was compiled for publication. Information received after that date will be used in succeeding issues of the WPI JOURNAL.

1906

The **L. Norman Reeves** recently sold their winter home in Florida and now reside all year at 24 Melrose Ave., Falmouth Heights, Mass.

1908

Class Secretary **Donald D. Simonds** writes that Marion Kendall, the widow of **Clayton Kendall**, passed away on February 25, 1975.

1912

The proposed Rte. 20 bypass paralleling Main Street in Marlboro, Mass., might be named Granger Boulevard in appreciation of a lifelong commitment to the community by **J. Francis Granger**. The proposal was recently made by the Massachusetts commissioner of public works, Paul Sharon, and is subject to the approval of the city council. Mr. Granger was superintendent of streets in Marlboro for 34 years and was clerk of the works for Marlboro Hospital. Currently he is a vice president of the Marlboro Hospital Corp. and a secretary of the Massachusetts Highway Association.

1913

William R. Stults, who now resides with his son in Macon, Ga., recently has taken trips to Ridgecrest, N.C., DeLand, Fla., and Massachusetts.

1918

Benjamin Luther continues to reside in Erie, Pa. and is active on behalf of the college. He has been named to the President's Advisory Council at WPI

1922

Prof. **Carl F. Meyer** is still leading his second professional life as a cellist in the Florida Symphony Orchestra, which has a yearly budget of $670,000. Although he retired ten years ago from teaching at WPI, he retains his ties to engineering by keeping his 26-year-old textbook, *Route Surveying and Design,* up to date. Alumni will be interested to know that the co-author of the new 5th edition will be Prof. **Robert Schultz, '55**, a full professor of civil engineering at Oregon State University. Recently Prof. Meyer has visited with **Russ Cushing, '22**, and **Bill Raymond**, a former student from the class of 1944. Bill is chief of the traffic section of the consulting firm of Gannett, Fleming, Corddry and Carpenter.

1928

Harold R. Voigt retired from the U.S.A.F. after 21 years of federal civil service. At the time of his retirement he was chief of the Fire Protection Division at Wright-Patterson AFB in Ohio.

1929

Francis Wiesman has been elected to the board of directors of the American Institute of Parliamentarians, St. Louis, Mo. He teaches parliamentary procedure at the School of Industrial Relations run by the archdiocese of Boston.

1930

Stanley H. Fillion is self employed part time. Most of his work is for the Dresser Transportation Equipment Division of Dresser Industries. He also enjoys woodworking, fixing up the house, and browsing in second hand book shops. . . . **James E. McLoughlin**, who was an engineering group leader at the A.W. Haydon Co., Waterbury, Conn., is retired. . . . **Fred P. Peters** continues as adjunct associate professor of management at Seton Hall University and is also an associate in BCM Associates, Inc., New York City.

1931

Everett E. Johnson, formerly of the Navy Department in Washington, D.C., is retired. He was married two years ago to Elizabeth Cameron and currently the couple resides in Bethesda, Md. . . . **William H. Mill**, a field manager with the Factory Insurance Association in Charlotte, N.C., for many years, has retired. . . . In March **Albert I. Palm** was commended by the Chief of Police in San Diego, Calif., for deliberately colliding his car with a driverless runaway vehicle which was rolling down a steep hill. The tribute read: "Your actions in this situation are commendable. You risked yourself and your property to stop a vehicle which, if it had been allowed to run its course, could have resulted in much more damage to property and/or to the death or injury of some innocent person."

1932

Edgar C. Ansaldi has retired. He was chief of the test department of Pratt & Whitney Aircraft, East Hartford, Conn. . . . **John O. Charles** has also retired. He was with the American Steel & Wire Co. in Dallas, Texas. . . . Other retirees include **Theodore S. Chmura**, American Bosch Corp., Springfield, Mass.; **Roland F. Downing**, plant engineer, Pratt & Whitney Aircraft, North Haven, Conn.; and **Earle E. Green**, division underwriting manager for the metropolitan New York area of Liberty Mutual Insurance Company following 42 years of service. Green was also general manager of the 600 employee, Lynbrook, L.I., office as well as assistant secretary of the company. . . . **Carroll C. Misener** recently retired as a mechanical engineer with the U.S. Naval Ordnance Lab. in Silver Spring, Md. . . . **Edwin L. Pollard** works for Ralph L. Woolpert & Co., Dayton, Ohio. . . . On the retired list is **Lawrence J. Sarkozy**, who had been a district sales manager for the Fenn Mfg. Co. in Newington, Conn.

1933

Alexander L. Alves has been elected chairman of the board and chief officer at Engineered Sinterings and Plastics Co., Inc., in Watertown, Conn. He had been president of the company since it was founded in 1954. Under his guidance the firm has grown from eight employees and sales of $109,733 to a current work force of 135 and sales of over $4.5 million annually. His company manufactures gears, cams, clutches and pole pieces for the electrical industry. . . . **Frank Eaton** retired in January after 19 years at Hamilton Standard, Windsor Locks, Conn. He was a senior designer in environmental control systems and was involved in design of equipment for the 747, L-1011 and other aircraft. He also worked on projects for the lunar module. The Eatons, who have four children and two grandchildren, recently returned from a two-month vacation visiting their daughter in Jupiter, Fla. They intend to concentrate on gardening and traveling during the retirement years. . . . **Robert W. Fulton** has completed forty years with the Factory Insurance Association of Hartford, Conn. He was the company's senior engineer in Portland, Me., and is a registered professional engineer in Maine and Massachusetts. . . . **William A. Slagle** is with the Massachusetts Division of Water Pollution Control in Boston.

1934

G. Standish Beebe serves as construction manager at Pfizer, Inc., New York City. . . . **Kenneth E. Bennett** is retired but keeping busy with a small chair reseating business. He writes that his older daughter, Kay, is a teacher and that his younger one, Freda, is a top student at Drew University.

1935

William E. Wyman has retired as a physical science administrator at the Office of the Secretary of Defense at the Pentagon in Washington, D.C. His son, Jon, graduated from WPI in May.

1936

Perry Clark recently celebrated the first anniversary of doing business with his own firm, Perry Clark Realty in St. Croix, V.I. He writes: "Glad to see any Tech men who may get down this way." . . . **Julius E. Guild** retired from American Optical Corp., Keene, N.H., last December. Since the Guilds' only daughter and family are in Washington State, they expect to settle somewhere in the west later this year.

1937

William S. Bushell, who was chief of the schedules branch of the National Airspace System Program office (F.A.A.) in Washington, D.C., has retired. . . . **H.I. "Red" Johnson** retired in February from the Bethlehem Steel Corp. after a 38-year career in the shipbuilding division and fabricated steel division.

1938

Richard I. Gray is a retiree. He was with the Department of the Navy, Bureau of Ships, in Washington, D.C. . . . **F.H. Jenkins** works for Phillips Getschow Co., Chicago, Ill. . . . **Henry M. Ritz,** president of R&R Plumbing Supply Corp. in Worcester, recently announced a $250,000 addition to his existing structure. His son, Jesse Ritz, entered the family business last June after receiving his master's degree from Boston College. He will be the third generation in the company which was started in 1905 by Henry's father. . . . **Dr. John B. Scalzi** works for the National Science Foundation in Washington, D.C. . . . **Stephen P. Stafford** is with Kennecott Copper Corp., Washington, D.C.

Dana D. Stratton retired from the federal government last November after 35 years of service in the field of naval aviation. He started at the naval aircraft factory in Philadelphia in 1939 and devoted his career to engineering specifications for the construction of carrier-based naval aircraft. At the time of his retirement, he was the director of the Engineering Specifications and Standards Department at the Naval Air Engineering Center, which is now being relocated to Lakehurst, N.J.

During his naval career he was a member of the Council for Military Aircraft Standards and the Navy liaison representative on the National Aerospace Standards Committee. Much of the work he did during World War II contributed to the establishment of the Department of Defense Standardization Program. He is a member of the Standards Engineers Society and the Naval Civilian Administrators Association. His name is listed in the Federal Roster of Key Scientists and Engineers.

At a banquet in his honor he was awarded the Meritorious Civilian Service Award and the Navy Outstanding Service Award. The Strattons' son, Wayne, graduated as an electrical engineer from WPI this year.

1939

Thomas F. Beatty, Jr. is now an estimator for GTE Sylvania in Needham Heights, Mass. . . . **James H. Bryson** is associated with the Chandler Glass Co., Inc., West Springfield, Mass. . . . **Allan H. Chase,** who was with Procter & Gamble, Cincinnati, Ohio for 35 years, recently retired. The Chases hope to relocate on Cape Cod. . . . **E.B. Crabtree** is assistant sales manager at Bryant Grinder Corp., Springfield, Vt. . . . **Gleason W. Jewett** works for J.W. Miller Aviation in Marble Falls, Texas. . . . **Edwin L. Kiem** has retired. He was a mathematics teacher at Warrington Middle School, Warrington, Fla. . . . Another retiree is **Edwin M. Moggio,** who had been an aerospace technologist for NASA. . . . **John T. Rushton** is with Harvey Engineering & Mfg. Corp. in Hot Springs, Arkansas.

1940

Married: **Rolfe Johnson** to Miss Margaret Morris in Cheshire, England, on August 31, 1974. The bride is a nurse. Currently Johnson is a resident engineer working on the construction of a plastics plant in Grangemouth, Stirlingshire, in Scotland. The Johnsons tour Britain and the continent as often as possible on their new BMW 750 motorcycle.

Dr. Clayton H. Allen is president of the Clayton H. Allen Corp., Cambridge, Mass. The consulting and development engineering firm is concerned with acoustics and noise control. . . . **S. Carlton Dickerman,** who retired in 1973 from active duty at New York University, has been named a Professor Emeritus of chemistry. He served as the last chairman of the department of chemistry in University College of New York University. (This campus is now the home of Bronx Community College.) The Dickermans are currently located in a lovely home on ten acres in Lyme, Conn. and write that they "don't miss the city one bit."

Clark Goodchild has received his master's degree in engineering management from Northeastern University, after an unfortunate year in 1974. He had jury duty during a murder trial; had his appendix and gall bladder removed; suffered two heart attacks and a bout of phlebitis. He finally was able to return to work in March. . . . **Sumner Meiselman** has joined the Truck-Trailer Manufacturs' Association in Washington, D.C. . . . **Frederick B. Miller** is with Dale Johnson Travel Agency in San Jose, Calif. . . . Presently **Richard E. Ryan** is a certified life underwriter at John Hancock Life Insurance Co., Falls Church, Va. . . . **Sidney E. Scott** works as a sales engineer with Electrolux in Hyannis, Mass., where he is also in real estate. . . . **James I. Thurston** is general manager at Waite's Industrial, Worcester.

1941

K. Blair Benson has been named vice president of engineering for Goldmark Communications Corp., Stamford, Conn. He will head the firm's engineering activities including divisions involving pay and cable TV. He has been with Goldmark since 1972. . . . **Francis J. Boyle** is a senior project engineer at Bendix Aviation in Kansas City, Mo. . . . **Robert E. Dean's** daughter, Julie, is currently with the Peace Corps in the Philippines. . . . **Anton J. West** is a self-employed income tax consultant in Bethel Park, Pa.

1942

Walter K. Deacon holds the post of president at Servonic Instrumentation Division of Gulton Industries, Inc., Costa Mesa, Calif. . . . **Harvey W. Maurice** owns Ramseyer and Miller, Inc., engineering consultants in Butler, Pa. . . . **William H. Moulton** is chief industrial engineer at Anaconda Wire & Cable in Sycamore, Ill. . . . **David Nyquist** serves as superintendent at Lykes-Youngstown Corp., Chicago. . . . **Charles P. Powell** is a design engineer at Rockwell International, Acme Chain Division, Hopedale, Mass. . . . **Frederick W. Schneider** works at Parkersburg (W. Va.) Community College.

1943

George F. Fairhurst holds the position of executive vice president of the Northridge Hospital Development Association in Northridge, Calif. . . . **Carl E. Hartbower** is now with the Federal Highway Department in Washington, D.C. . . . Lt. Col. **Charles A. Jenkins, Jr.,** who has retired from the U.S. Air Force, is now a self-employed periodontist in Tuscon, Arizona. . . . **James L. Loomis, Jr.,** works for Fryer Corp., Oxford, Conn.

1944

Glen R. Betz retired in June. He had been general supervisor of process engineering for Frigidaire in Dayton, Ohio. . . . **T.A. Bombicino** is manager of manufacturing and engineering at Allied Products Corp., New Haven, Conn. . . . **Sherman B. Campbell** currently serves as chief industrial engineer at Champion Products, Perry, N.Y. . . . **Alfred F. Larkin, Jr.,** is president of the International Group at Rexnord, Inc., Milwaukee, Wisconsin. . . . **Arthur P. Pingalore,** director of training at Cincinnati-Milacron, Heald Machine Division, Worcester, has been appointed to a five-year term on the advisory board at Anna Maria College, Paxton, Mass. . . . **George D. Williams** is a project engineer for NEGEA Service in Cambridge, Mass.

1945

William C. Howard, vice president of the Abrasives Marketing Group at Norton Co., Worcester, was recently elected a member of the executive committee of the American Supply and Machinery Manufacturers' Association, Inc. He has been a member of various ASMMA committees in the past. The association has 500 members which are manufacturers of a wide variety of products used in industry. . . . **Roger N. Perry, Jr.,** public relations director at WPI, has been elected to the New England district executive committee of the Council for the Support and Advancement of Education (CASE). CASE is a new organization created by the 1974 merger of the American College Public Relations Association and the American Alumni Council. . . . **James J. Shea** is a project leader at the Nuclear Regulatory Commission in Bethesda, Md.

Roger Roberge's consulting engineering firm, Roberge & McGrath, Inc., of Lexington, Mass., has been named a winner of the 1975 annual award for engineering excellence presented by the Consulting Engineers Council of New England. The award was given to the company for its environmental energy conservation design of the Billerica (Mass.) High School addition. Through unique reuse of energy and its conservation, the new addition will have minimal operating costs and construction costs will be 25 percent less than planned, the firm reports.

Included in the design is a mechanical system which provides separate air supply and air conditioning components for each fifteen feet of exterior wall. Heated or chilled water is circulated to these units as needed. Refrigeration machinery being driven at slow speed and fueled with natural gas and heat recovery devices capture 60 percent of the heat needed to make ice, hot water, and to cool and heat the building. Overall, heat energy use was cut by 40 percent and construction costs were held to $26 per square foot.

Albert P. Talboys holds the post of project manager at the Pan American Health Organization in Port-of-Spain, Trinidad. He retired as chief engineer for International Health in the U.S. Public Health Service last year.

1946

Currently **Richard H. Ackley** is with the electromagnetic systems division of Raytheon in Goleta, Calif. . . . **Robert D. Bartlett** works for Hobart Corp., Kansas City, Kansas. **Robert E. Boddorff** has been named director of the specialty products division of the coatings and specialty products department at Hercules, Incorporated. He began working for the company as a research chemist following graduation. He has served as a technical representative in the firm's Chicago office, senior technical sales representative, and manager of the Houston office in the coatings and specialty products department. He became assistant director of marketing of the department in 1971 and director of sales for specialty products in 1973.

Richard Galuhn works for the Los Angeles County Facilities Department. . . . **Robert S. Gamble** is with New England Petrochemical in New York City. . . . **Theodore E. Gazda** serves as projects manager at Fluor Engineers & Constructors, Inc., in Commerce, Calif. . . . Judge **Ernest S. Hayeck** of Worcester's Central District Court has been named the 1975 recipient of the Beth Israel Brotherhood Good Neighbor Award. . . . **Robert C. Manahan** is now group manager of marketing services at Johns-Manville Corp., Arlington, Va. . . . **I.T. "Tom" McDonald** has been appointed manager of the new Deltona office of the First Federal Savings and Loan Association of Daytona Beach, Fla. He joined the association last year as a loan counselor in the DeLand office. He retired with the rank of colonel from the U.S. Air Force in 1973, completing 31 years of military service. At the time of his retirement, he was chief of the policy and plans division for Air Force Intelligence in Washington.

John C. Meade is a technical representative at Ashland Chemical Co. in Commerce, Calif. . . . **Richard H. Merritt,** a senior product engineer and manager of abrasive machining for Bay State Abrasives in Westboro, Mass., participated as a session leader at the 1975 ASAM International Technical Conference and Exhibition held in Chicago last May. His topic was "A Decade of Abrasive Machining — So What?" . . . Presently **Walter O. Muller** is plant manager at the Chevrolet gear and axle plant in Detroit, Michigan. . . . **Joseph F. Pofit** is assistant chief engineer at Crane Co., Indian Orchard, Mass. . . . **Arthur P. Rosenquest** serves as president of Dust Vent, Inc., Addison, Ill. . . . **Herbert H. Slaughter, Jr.** has retired. He was chief of the engineering and manufacturing division of the Federal Aviation Administration in Washington, D.C. . . . **John L. Wilki, Jr.** is president of CVM Corp., an air pollution control business, at 406 Philadelphia Pike, Wilmington, Deleware. . . . **Robert E. Willis** serves as area manager for General Electric in Omaha, Neb.

1948

Robert W. Henderson, vice president of marketing for Rodney Hunt Company, Orange, Mass., has been elected a director of the firm. He joined the company in 1956 as an application engineer in the water control equipment division. Later he was a manager, vice president, and marketing head. . . . **Frank S. Holby** works in the Apollo System Space Division of General Electric in Huntsville, Alabama. . . . **William T. Nurney** is on a temporary assignment as a group leader for the Mitre Corp. in Houston, Texas.

1949

Paul H. Beaudry is project manager at IBM-Real Estate & Construction Division in Austin, Texas. . . . **Russell F. Bradlaw,** a project engineer for the Turner Construction Co., was in Saigon in April. He reports that he saw no panic, no looting, and no anti-foreigner attitude. Currently he is engaged in building a $40 million apartment complex in Hong Kong. Called Mei Foo Sun Chuen, the complex is probably the world's largest privately financed housing project. It will comprise some 100 twenty-story blocks housing up to 90,000 people in 13,000 apartments. Previously he had helped to build a $10 million water treatment plant for Turner Construction in Saigon.

In March **Philip G. Buffinton** was appointed vice president and secretary and chief administrative officer of the State Farm Fire and Casualty Company in Bloomington, Ill. . . . **Samuel E. Franc, Jr.** writes that he is now a real estate salesman for Country Homes Real Estate in Danville, Calif. Marcia is in the eighth grade and Susan, the sixth. Betty works for Social Security. . . . **Donald Taylor** holds the post of president of the Nordberg Machinery Group at Rexnord, Inc., in Milwaukee, Wisconsin.

James B. Morin, who had been a captain in the U.S. Navy, was promoted to Rear Admiral in ceremonies held at the Naval Base in Norfolk, Va. last May. He is the deputy director of the National Military Command Center, Joint Chiefs of Staff, Washington, D.C. He won his wings in 1948. As commanding officer of Attack Squadron 155 on the carrier USS Coral Sea in 1965, he flew 157 combat missions over North Viet Nam. He was awarded a Distinguished Flying Cross during one of those missions when he attempted a rescue. He has commanded the amphibious transport USS LaSalle and the carrier, USS Franklin D. Roosevelt. His decorations include two DFC's, the Bronze Star Medal, two Meritorious Service Medals, eighteen Air Medals, and three navy Commendation Medals.

1950

Robert O. Budd is manager of plant safety at Westinghouse-Hanford Co., in Richland, Washington. He is married, has three children, and is a member of the city of Richland Ecology Commission. . . . **Robert L. Moison** operates Robert L. Moison & Associates, Inc., Apple Valley, Minn. . . . **Jeremiah P. O'Neil** has been appointed manager of energy utilization by Nabisco, Inc., New York City. . . . **Richard C. Pieper** is senior vice president and general manager at Bently Nevada Corp., Minden, Nevada. . . . **Eli S. Sanderson** has been appointed manager of planning and control for engineering and construction services at Norton Co., Worcester. He has been with Norton since 1950 and has served as supervisor of industrial engineering and most recently as manager of facilities and services. He is a registered professional engineer.

1951

Phillip G. Blair is plant engineer at Paper Products, Inc., Long Beach, Calif. . . . **Dexter Cate** has been promoted from project engineer, custom systems, to manager of quality control at Fairbanks Weighing Division, Colt Industries, St. Johnsbury, Vt. In his new assignment he is responsible for all the inspection and test done in the division. . . . **Walter J. Kolodne** has joined Titan Atlantic Construction Corp. in Towson, Md.

1952

Currently **Harold R. Althen** is vice president of sales at the Mikropul Division of United States Filter Corp. in Summit, N.J. . . . Mr. and Mrs. **Bruce Campbell** and **Ojars Silarais, '65,** recently co-hosted a farewell party honoring the **Wayne L. Pierces, '68,** who are moving from Louisiana to New Jersey. All three alumni lived in a 500-ft. circle in the same apartment building overlooking the same swimming pool until Pierce was transferred. The trio met again at Pier 4 in Boston on May 31st.

Lex Carroll, president of Carroll Chevrolet, Inc., West Brookfield, Mass., was recently reappointed manager of the National and World Competitive Water Ski Team for 1975 by the American Water Ski Association. The team will compete in the World Championships in London, England, in September. Carroll was originally appointed to the post in 1973 when the World Championships were held in Bogota, Columbia. He has been water skiing for 30 years, becoming well known as an all around show skier, barefooter, and kite flyer. He is the founder of the Lake Wickaboag Ski Club in West Brookfield and cofounder of the Central New England Water Ski Association. He and his wife became noted in North and Latin America in the 1950s for their competitive skiing and were the East's top representatives in regional and mixed doubles competition. They achieved an overall record that may never be surpassed.

1953

Richard A. Davis, president of the Thermos Division of King-Seeley Thermos Co., Norwich, Conn., has been named to the Norwich Advisory Board of Hartford National Bank & Trust Co. . . . **Dr. Robert Fitzgerald,** associate professor of civil engineering at WPI, was the keynote speaker at the Connecticut State Fire Officers' Conference held in May in Meriden, Conn. . . . **George A. Garrison,** SIM, is now vice president of manufacturing at Anderson Corp., Worcester. . . . **Thomas R. LaCrosse** serves as manager of computer programming in the oceanic division at Westinghouse Electric Corp., Annapolis, Md. . . . **John E. Leach,** who continues with E.I. duPont de Nemours, is currently plant manager in San Francisco, Calif. .. . **Dale E. Westbrook** is chief, quality control group, for Marine Data Systems Program, National Ocean Survey, Rockville, Md.

1954

Leslie W. Johnston, Jr. works for Singer Co., Binghamton, N.Y. . . . **Vahram Keshishian** works for TRW Systems in Redondo Beach, Calif. . . . **Donald E. Ross** has been named general manager of MPB Corporation's Split Ballbearing Division in Lebanon, N.H. The firm manufactures high precision ball and roller bearings for aircraft, materials-handling equipment, hydraulic pumps, medical equipment, and machine tools. Ross is a director of the National Bank of Lebanon and a member of the corporation of Mary Hitchcock Memorial Hospital. He joined Split Ballbearing in 1962 and had been operations manager since 1971. . . . **B. Lawrence Sova** is with the U.S. Power & Environmental Branch in Aberdeen, Md.

1955

Dr. Howard J. Dworkin is presently chief of the department of nuclear medicine at William Beaumont Hospital in Royal Oak, Mich. . . . **R. Bruce Brodie** is a patent attorney at IBM Patent Operations in San Jose, Calif. . . . **Norman M. Lawrence** serves as a planning and scheduling engineer for Allied Chemical Corp., Morristown, N.J. . . **Donald M. McNamara** has been appointed product manager of plasticizers at USS Chemicals, a division of U.S. Steel Corporation in Pittsburgh, Pa. He will be in charge of the marketing and distribution of plasticizers and their derivatives internationally. He began his career with the corporation as a New York sales representative in 1963. In 1965 he became product manager for dibasic acids in Pittsburgh and regional sales manager for the Midwest four years later. He is a member of the Society of Plastics Engineers.

Patrick J. Murphy is at the Naval Surface Weapons Center, Dahlgren, Va. . . . **Walter B. Power III** has been appointed by the mayor to the planning board in Salem, Mass. Currently he is serving as chairman of the School Building Commission. He is a registered professional engineer and a senior sales engineer for McGraw Edison, Power Systems Division. . . . **Howard D. Youmans,** SIM, now serves as a sales manager at Morgan Construction, Worcester.

1957

Salvatore H. Bello works for U.S. Steel Corp., Worcester. . . . **Robert F. Galligan** was recently elected vice president of operations and secretary at Gibbs/Cook Equipment in Des Moines, Iowa. He joined the company in 1964. . . . **Walter C. Kress** is manager of facilities planning at American Cyanamid Co., Pace, Fla. . . . **David N. Olson** operates D.J.B. Mobile Homes in Shingle Springs, Calif. . . . **James F. Richards,** general sales manager for the R.H. Miller Division of Pennwalt Corp. in Homer, N.Y., wrote an article, "Alkaline Preclean to Cut Costs," which appeared in the February issue of *Wire Journal*. . . . **John O. Stinson,** former hospital administrator for the Berkshire Medical Center in Pittsfield, Mass., has been selected town manager in Hanover, N.H., from over 100 applicants. Previously he was city manager of Ipswich and Saugus, Mass. He has an MBA from the University of Massachusetts.

Not long ago, **Donald Striby** was helping to send men into space at Cape Canaveral as a NASA launch-test conductor. Today he and his family are literally living off the land on their 13-acre farm in Rehoboth, Mass. The Stribys raise 85 percent of what they eat, including beef, poultry, eggs, and vegetables. They also cut their heating and light bills by using wood stoves, kerosene lamps, and candles. Just to keep busy, Striby does all his own plumbing, electrical work, carpentry, and auto repairs. On the side he helps his wife raise English sheep dogs, and he has built her a ceramics workshop. Their sons bake and help with the chores. In spite of what seems like a 'round-the-clock schedule, the Stribys claim their new life is "a lot more relaxing!" . . . **Ronald Wilson** is a senior research assistant at the Worcester Foundation for Experimental Biology in Shrewsbury, Mass.

1958

Foster Wheeler Energy Corporation has currently assigned **Everett W. Angell** to the company office in Rio de Janeiro, Brazil. . . . **Robert J. Donegan** works for ESL, Inc., Sunnyvale, Calif. . . . **Roy E. Handy, Jr.,** SIM, has been appointed vice president of manufacturing at Wain-Roy, Inc., Hubbardston, Mass. He is a chairman of the board of directors of Asnacomet Federal Credit Union, a director of the Hubbardston Industrial Development Corp., and has served many years on the Hubbardston planning board and industrial commission. . . . **Stanley L. Green** is now with the Drug Enforcement Administration of the U.S. Department of Justice in Washington, D.C. . . . **Alan A. Miller** holds the post of planning engineer at Western Electric Co. in Winston-Salem, N.C. He also owns Puppy Country Kennels and breeds and sells purebred puppies. . . . **Ralph Paganetti** is with American Science & Engineering, Inc., Cambridge, Mass.

The recent paintings of **Bill Rabinovitch** were exhibited at the Rabinovitch & Guerra Gallery in New York City in April and May. The title painting of the show, "New York Now," expresses the artist's vision of New York in February, a city caught up by its energy and mobility. According to the *Soho Weekly News,* the Rabinovitch & Guerra Gallery, in which Bill is a partner, "is a meeting place for artists whose thrust is aimed at expressing a visceral expression of what is closest to a given artist's most immediate concern: his inner life and visualization thereof."

Donald H. Tompkins is a physicist with the U.S. Geological Survey, Menlo Park, Calif.

1959

Robert G. Chadwick was recently promoted to manager of the Torrington Co. bearings plant in Sylvania, Ga. He had been manufacturing manager at Sylvania since 1973. Previously he was superintendent of drawn cup and thrust bearings at the Torrington, Co. in Connecticut. He began his career with the company as a project engineer. . . . **Joseph D. Daddario, Jr.**, works for Sylvania in Waltham, Mass. . . . **A. David Dickert** is now assistant to the vice president of corporate ventures at Rohm and Haas Co., Philadelphia, Pa. . . . **P.D. Edwards** is a project manager at Chemplex, Rolling Meadows, Ill. . . . **James M. Lawson**, SIM, holds the position of vice president of O.S. Walker Co., Inc., Worcester. . . . **Robert H. Lynn** left the Raytheon Company last October and joined the engineering firm of Chas. T. Main, Inc., in Boston. He serves as client relations manager for the industrial division, with offices in the Prudential Center. The Lynns, who reside in Framingham, have three children: Heidi, 8; Eric, 6; and Craig who is 4. . . . **Robert V. Sharkey** is now the owner of Shark's Marine in Keene, N.H. He sells Mercury outboards, Mercruisers, and snowmobiles. He is also a dealer for Glastron ski and sportsboats; Starcraft fishing boats, and runabouts; canoes; sailboats; and marine hardware. "Since moving to New Hampshire," Bob reports, "I've had a chance to do some fishing which I hadn't had time to do in nearly 20 years."

1960

Joshua C. Alpern is with the U.S. Army Scientific Liaison & Advisory Group in Washington, D.C. . . . **William K. Bonta** is deputy director of air quality control for the Maryland State Department of Health in Baltimore. . . . **Donaldson A. Dow** works as a senior structural engineer at Perry Ocean Engineering, Inc., Riviera Beach, Fla. . . . **Russell A. Fransen** is with Luchs & Beckerman in Glastonbury, Conn. . . . Currently **Richard L. Gess** works at Ketron, Inc., Warminster, Pa. . . . **Stephen J. Hewick** is a bridge engineer at Lewis Berger Co., East Orange, N.J. . . . **Paul W. Kendra, Jr.**, serves as a senior systems analyst at General Electric Co., Arlington, Va. . . . **Stuart P. Roberts** writes that his wife passed away on March 2 following a brief illness. . . . Dr. **Charles A. Stevens** is associate dean at Southern Technical Institute in Marietta, Ga. . . . **Derin K. Turkomer** serves as assistant general manager for Turyag AS in Izmir, Turkey. . . . **Stanley C. Wells, Jr.**, is now assistant to the director of research and development for N.D.M. Corp., Dayton, Ohio. He directs engineering for the extrusion and injection molding of medical products as well as materials engineering.

1961

Married: **Robert A. Weiss** to Miss Bonnie Joan Geller of Milton, Massachusetts last August. Mrs. Weiss is a teacher at Needham High School. Her husband was recently named production and inventory control manager for Grinnell Fire Protection Systems Co. of Rhode Island and is located in Providence.

Born: to Mr. and Mrs. **Gerald E. Kuklewicz**, a second son, Andrew Train, on February 5, 1975. Gerry is a sales engineer for General Electric Co. and sells central air conditioning and heating.

Brad Cushing left the G.E. Knolls Atomic Power Laboratory in Schenectady, N.Y. last August and now works as a project engineer for Enviroengineering, Inc., a division of H.V. Weeks, Inc., located in Somerville, N.J. The consulting firm specializes in all phases of pollution control. Brad and his wife, Mary, have an 18-month old son, Terence. . . . **Roger E. Faulk** works for Travelers Insurance Co., Product Management Division, Hartford, Conn. . . . **William H. Gill** is currently director of environmental services at Development and Resources Corporation, Sacramento, Calif. . . . **Robert R. Hale** works for the Optical Radiation Corp. in Azusa, Calif. . . . **Arthur Kroll** has joined Fairbanks Weighing Division of Colt Industries in St. Johnsbury, Vt. as manager of product development. Formerly he was engineering manager for commercial products at EDMAC Associates in Fairport, N.Y. . . . **Thomas P. Lopresti** is now a health industry analyst for IBM, health industry development, Des Plaines, Ill. . . . **Richard H. Nelson** holds the post of principal engineer at Harris Corp., Electric Systems Division, Melbourne, Fla.

Normand L. Noel is district manager of sales engineering at Gilbane Building Co., Lanham, Md. . . . **John F. Ogorzalek** has completed work for his Juris Doctor degree at Western State University and will take the bar exam this summer. He is works manager at Tenneco Chemicals, Inc. in Long Beach, Calif. . . . **Thomas J. Pearsall** works at Quantum, Inc., Wallingford, Conn. . . . **Pierce "Ned" Rowe** serves as division manager at Burke Concrete Accessories, Inc., South San Francisco, Calif. . . . **Edward A. Sundburg** has been appointed product engineering manager of armor and Spectramic products in the Industrial Ceramics Division at Norton, Co., Worcester. He joined Norton in 1964. . . . **Kenneth J. Virkus** is a senior research chemist at General Cable Corporation in Union, N.J.

1962

Dr. **Charles F. Belanger, Jr.**, is now at the University of Massachusetts Medical School in Worcester. . . . **Bradford J. Booker** serves as a senior analysis engineer with United Aircraft's Power Utility Division in South Windsor, Conn. . . . **Currently** Robert C. **Clark** is with Monsanto Chemical Co. in Indian Orchard, Mass. . . .**Giacomo Corvini** has joined the sales office of the molecular sieve department at Union Carbide Corp., in Tulsa, Oklahoma. . . . **Sharad S. Gandbhir** has been named a senior process engineer at Stone & Webster Engineering Corp. in Boston. In 1967 he started work at the company as an engineer. . . . **Robert H. Hall** is now the manager of the new product development and technical services department at New England High Carbon Wire Corp., Millbury, Mass. He joined the company in 1962 and served as research metallurgist before being promoted to chief metallurgist in 1968.

George W. Holman is with Holman Engineering, Inc., Indian Orchard, Mass. . . . Presently **David N. Lyons** holds the post of chief of the compliance branch of Water Enforcement at EPA in Washington, D.C. . . . **Michael E. Rafferty** was recently named manager of the Boston operation and vice president of BSC Engineering, Inc., Boston survey consultants. . . . **John C. Rupprecht** works for R.B. Richardson Co., Royal Oaks, Mich. . . . **Jerome R. Temchin** is chief, statistical analysis support, at the Federal Energy Administration in Washington, D.C. . . Currently **Walker T. Thompson** serves as associate manager of inventory planning and control at Union Carbide Corp. in Charleston, W. Va. . . . **John M. Wallace** is with Wallace & Wallace, Springfield, Mass. . . . **Raymond B. Wilson, Jr.** works for QEI, Inc., Computer & Information Systems, Bedford, Mass.

1963

Robert J. Craig has been employed by Hydrospace-Challenger, Inc., in Rockville, Md. . . . **Stephen D. Donahue, Jr.**, who is with Procter & Gamble, is now located in Madrid, Spain. . . . **Thomas M. Donegan** was recently made director of international development for Hughes AirWest in San Mateo, Calif. Currently he is directing aviation assistance programs in Nepal, Burma, Liberia, and Mauritania. His most recent contract, concluded in January, was with Saudi Arabia for the establishment of an "instant" domestic airline. . . . **Robert J. Hermes**, SIM, works as a sales manager at Birdsboro Corp., Birdsboro, Pa. . . . Dr. **Allen H. Hoffman** has been promoted to associate professor in the mechanical engineering department at WPI. He joined the teaching staff in 1964, did postgraduate study at Case Institute of Technology, and received his PhD from the University of Colorado. He has had industrial experience with Shell Oil Co. Riley Stoker Corp., and General Electric Co.

Dr. **Peter F. Lilienthal II** is a research leader at Western Electric Co., Princeton, N.J. . . . **James J. Magaldi** serves as a plant engineer at ITEK-Uniuis Optical, Guayama, Puerto Rico. . . . **Henry Schroeder** is a senior systems programmer at Foxboro (Mass.) Co. . . . Currently Major **James A. Velezis** is deputy chief of staff for the U.S. Department of the Army at the Pentagon in Washington, D.C. . . . **Harold H. Wright** holds the post of district sales engineer at Wer Industrial in North Reading, Mass.

1964

Donald A. Ghiz is operations superintendent at Continental Oil Co., Westlake, La. . . . **Gerald A. Gutman** is now vice president of marketing for Communication Associates of Huntington Station, N.Y. The company manufactures HF/SSB radio systems. . . . **Terrance B. Harris** has been transferred to Union Carbide's Tarrytown, N.Y. site where he is now assistant export marketing manager for the molecular sieve department. To date his travels have taken him to Brazil, South Africa, and Mexico, with tentative trips to Europe and Japan in the offing. . . . **Philip Johnson** works at Gould, Inc., Plantsville, Conn. . . . **Earle Megathlin, Jr.** works for Robert E. Owen & Associates, West Palm Beach, Fla. . . . **Bruce A. Ochieano** holds the post of treasurer at Advanced Micro Devices, Sunnyvale, Calif. . . . **Leo Pluswick** is currently an electronic engineer at Ft. Meade, Md.

Robert W. Wehrli, MNS, teaches at Gallaudet College in Washington, D.C. . . . Currently **William R. Phillips** is superintendent of finishing, Organic Products, at Norton Co., Worcester. . . . **William S. Shurbet** now serves as administrative manager in the Bureau of the Budget in New York City. . . . **William S. Swiger** works at Project Software & Development, Inc., in Cambridge, Mass. . . . **Louis A. Wargo** is with State National Bank in Bridgeport, Conn. . . . **Seymour Williams III** serves as a program manager at Computer Sciences Corp., Falls Church, Va.

1965

Born: to Mr. and Mrs. **Robert H. Cahill,** a daughter, Emma, on April 23, 1975. Cahill is with Hilti Fastening Systems, Stamford, Conn. . . . to Mr. and Mrs. **Robert Juckins,** their first child, a son, Christopher Anthony, on March 16, 1974. Bob is with the R & D Department at Wyman-Gordon in Millbury, Mass.

David S. Clayton has been named assistant to the chairman of Piper, Jaffray & Hopwood, Inc., a Minneapolis-based securities firm. He joined the firm's corporate finance department in 1972 and was elected a vice president in 1973. Previously he was with the First California Company and the Worcester County National Bank where he was a computer programmer and systems analyst. From 1966 to 1970 he was an instructor in math and reactor physics and a department head at the U.S. Naval Power School in Vallejo, Calif.

Charles J. DeSimone has been named senior corporate finance officer at the Society For Savings in Hartford, Conn. Previously he had been with the Hartford National Bank & Trust Co. where he was a corporate banking officer. Prior to entering the banking field he was with General Dynamics Corp. and Hamilton Standard, Windsor Locks, Conn.

Francis X. Dolan, Jr. is now a research engineer at Creare, Inc., Hanover, N.H. . . . **William J. Dolbow** works for Nashua (N.H.) Corp. . . . **James E. Frappier** is with Stauffer Chemical Engineering and Construction in Bucks, Ala. . . . **George L. Humphrey** is a computer specialist at Systems Development Corp., Falls Church, Va. . . . **Thomas R. Lee** works for the Bureau of Radiological Health, Rockville, Md. . . . **James S. Main** is at the National Library of Medicine in Bethesda, Md. . . . **Arthur A. Padovano** serves as district manager of the Dayton (Ohio) office of the Torrington Co.

1966

Born: to Mr. and Mrs. **Grant P. Maier,** a daughter, Jennifer Riley, on April 6, 1975. Grant is with Pratt & Whitney Aircraft, East Hartford, Conn.

Dr. Ahmet K. Atakan is an assistant professor at Bogazici University in Istanbul, Turkey. He received his PhD in physics from the University of Tennessee. . . . **Christopher G. Foster,** who married Miss Roberta Jill Hooper of Stoke Lacy, Herefordshire, England, last year, is still with the Naval Underwater Systems Center in New London, Conn. His wife is a graduate of Nottingham University. Currently she's doing graduate work at Eastern Connecticut State College. . . . **Thomas J. Curry** is with Naval Underwater Systems, Newport, R. I. . . . Captain **Eugene R. Dionne,** a launch vehicle systems officer assigned to Los Angeles Air Force Station, Calif., participated last winter in the Air Force world-wide ski meet held at Snow Basin, near Hill AFB, Utah.

Bernie Duesel writes that he recently joined Wickhen Products, Incorporated as the production manager of the Huguenot, N.Y. plant. The company manufactures chemical specialties for the cosmetics, pharmaceutical and allied industries. The family resides in Goshen, N.Y., where Bernie, his wife, Lynn Ann, and two children have spent the past three years enjoying the switch from urban to country living. . . . **Gordon E. Eaton,** MNS, has been installed as the new president of the Ludlow (Mass.) Education Association. He has been a member of the Ludlow High School science department since 1970. . . . **Kendall W. Gordon, Jr.,** holds the post of design engineer at Federal Products Corp., Providence, R.I. . . . **John J. Lenart** is with the U.S. Geological Survey in Reston, Va.

Currently **Richard Leon** serves as a technical sales representative for Eastman Kodak Co. and is located in Tuscon, Ariz. He is responsible for technical assistance to radiologists and sales promotion of X-ray film, chemicals and film processors. . . . **Donald R. Nitche** works for the Hartford Insurance Group, Hartford, Conn. . . . **George B. Ordway** serves as facility manager of applications engineering at the C.G. Bostwick Co., Hartford, Conn. . . . **Gerald J. Parker** works for the Federal Energy Administration, Washington, D.C. . . . **Joseph J. Pastic** was recently awarded his professional civil engineering license at ceremonies at Guam, Mariana Island. Presently he is prinicipal engineer of the Department of Public Works planning division in Guam. He is completing requirements for his MBA degree at the University of Guam.

Raymond V. Pierce is a TVA field engineer on a nuclear plant site in eastern Tennessee. . . . **Michael F. Salvini** works as a wire mill superintendent for Bedford Wire in Bedford Heights, Ohio. . . . **Ashok D. Shah** owns Quest, Sherman Oaks, Calif. . . . **Earle L. Sims, Jr.** is a sales engineer at Farrel Co., Ansonia, Conn. . . . Dr. **Henry R. Skutt** is an electrical engineering professor at Virginia Polytechnic Institute, Blacksburg, Va. . . . **Richard H. Somers II** holds the post of director at Different Drummer Building Associates in Howard County, Md. and Montgomery County, Va. The firm is an open-ended but limited partnership of architects, builders, craftsmen, engineers, and designers dedicated to quality construction. . . . **Earl C. Sparks III** is a project engineer at Sobin Chemical Corp. in Ashtabula, Ohio. He recently received his MBA from the State University of New York in Buffalo. Earlier he was with Hooker Chemical Corp., Niagara Falls, N.Y., for four years. . . . Presently **Roman Sywak** serves as an administrative assistant at Pratt & Whitney Aircraft in East Hartford, Conn. . . .**Robert W. Thompson** works for the Chesapeake Division of N.A.F.A.C., Washington Navy Yard, Washington, D.C. . . . **Robert J. Zavatkay** has joined Associated Spring Corp., Bristol, Conn.

1967

Married: **Paul E. Kazemersky** to Miss Marianne Seabury on May 17, 1975 in Ansonia, Connecticut. The bride, a graduate of Bridgeport Hospital School of Nursing, is employed by Griffin Hospital. She belongs to the American Association of Critical Care Nurses. Her husband has been with the Navy in Groton.

Born: to Mr. and Mrs. **Edward W. Piltzecker, Jr.,** a daughter, Kristin Sarah, on May 21, 1974. Ed is now employed by the Foxboro (Mass.) Co. as a system engineer.

Richard A. Alliegro, SIM, director of research and new business development of the Industrial Ceramics Division at Norton Co., Worcester, has been named to the board of directors of Laser, Inc., Sturbridge, Mass. The company develops and manufactures industrial laser machines for welding and drilling applications. Alliegro has eight patents and is credited with the development of lightweight ceramic armor presently in use on advanced helicopters and attack aircraft. A registered professional engineer, he is a fellow of the American Ceramic Society, president of the National Institute of Ceramic Engineers, and serves on the ceramic committee of the Society of Automotive Engineers.

Frank M. Amazeen works as a design engineer for AMF Precision. . . .**Dwight M. Baker,** who operates Affiliates in Civil Engineering, Marshfield, Vt., was elected selectman for Marshfield last March. He also is president of the town's volunteer fire company, a licensed surveyor, and a registered professional engineer in Vermont. Formerly

he was president of the Capital City Jaycees, president and treasurer of the Vermont section of ASCE, and chairman of the Marshfield planning commission. . . **Gene Baldrate**, a senior engineer with the Southern New England Telephone Co., New Haven, Conn., was recently elected to the Board of Directors of the Federal Telephone Employees Credit Union. . . . **Russell P. Bone** works for Stone & Webster Engineering in Boston. . . . **Patrick Butler** is a test engineer at the U.S. Air Force Rocket Propulsion Lab., Edwards AFB, Calif. . . . Presently **Robert J. Dashner** serves as manager of data processing at the Millipore Corporation in Bedford, Mass. . . . Dr. **Richard A. Fine** is an advisory engineer at IBM in Rochester, Minn. . . . **Robert E. Gohsler**, a systems engineer with IBM, is located in San Diego, Calif. . . .

Lawrence R. Gooch holds the post of project engineer at Farrel Co. in Ansonia, Conn. Currently he is project manager and resident engineer on an equipment installation and building modification for the 3M Company in Bristol, Pa. . . . **Joseph Goulart** recently joined the National Highway Traffic Safety Administration in Washington, D.C. He is a safety research engineer . . . . **Joseph A. Lagana** is part owner of Liberty Store in Meriden, Conn. . . . **Burton F. O'Rourke**, SIM, has been appointed chief engineer of project engineering and kiln design for engineering construction and services at Norton Co., Worcester. He began working at the company in 1937. . . . **Charles Pollock** is with public relations at the National Machine Tool Builders Assoc., McLean, Va. . . . Capt. **Bruce F. Rogers** serves as a test designer for the U.S. Army Operational Test & Evanuation Agency in Ft. Belvoir, Va. Recently he completed graduate degrees, MBA and MSOR, at Tulane University where he was sponsored by the army's advanced degree program. . . . **Kenneth G. Schurzky** has been promoted to project scientist in the research and development department at Union Carbide in Piscataway, N.J. He joined the department in 1967. . . . **Raymond P. Seguin** holds the post of manager of quality control at Carrier Air Conditioning in Collierville, Tenn. . . . **Robert C. Young** is market manager at EG & G, Inc. Environmental Equipment Division, Waltham, Mass.

1968

Married: **Mark A. Freyermuth** and Miss Mary Zailskas on April 19, 1975 in Waterbury, Connecticut. Mrs. Freyermuth graduated from the Waterbury Hospital School of Nursing. She received her BS in nursing from the University of Bridgeport and is studying for her master's at Southern Connecticut State College in New Haven. She is a public health nurse for the city of Waterbury. . . . **Carl P. Steele** to Miss Helena P. Cuddy in West Roxbury, Massachusetts on February 22, 1975. The bride graduated from Boston State College, where she also earned a master's degree.

Francis L. Addessio recently received a PhD from Purdue University and is now doing postdoctoral work there on gas discharges with applications to molecular lasers. . . . Dr. **R. Omur Akyuz**, who received his PhD in physics from Brown University, is currently an assistant professor at Bogazici University in Istanbul, Turkey. . . . **Stephen O. Allaire** has passed the Connecticut Bar Association examination. He has been appointed to a one-year clerkship for Chief Justice Charles House of the Connecticut Supreme Court. He attended Georgetown University Law School. . . . **Robert G. Balmer** is an environmental engineer at Exxon Research & Engineering, Florham Park, N.J. . . . **John C. DeMeo** is on the staff of Coginchaug High School, Durham, Conn. . . . **Jeffrey A. Decker** was recently promoted to manager in the Northern New Jersey real estate office of the Prudential Insurance Co. in Newark. He joined the company's New York City real estate investment office in 1973 and has just been transferred to Newark. Currently he is a member of the Young Men's Mortgage Committee, New York.

Carl R. Dupre works for Monsanto Co., Indian Orchard, Mass. . . . Prof. **Robert B. Gillies**, MNS, who has been teaching at Quinsigamond Community College, Worcester, for nine years, has been selected to appear in the 1975 edition of *Outstanding Educators of America*. The national honor is in recognition of his academic accomplishments and contributions. . . . **William J. Giokas** and **Andrew J. Giokas '70**, are partners in the firm, William J. Giokas, Chicopee, Mass. . . . **David J. Gumbley** works for Getty Pipe Co., Hazelton, Pa. . . . **Steven G. Halstedt** was recently elected a director of Cominvest of Hartford, Inc., a minority enterprise small business investment company organized by Society for Savings. He is an analyst in the securities department of the Travelers 'Insurance Co., Hartford. . . . **Jeffrey J. Hultman** received his JD in Law from Southwestern University, Los Angeles, in May and has been studying for his bar exam.

Charles D. Konopka serves as a special assistant to the commissioner of education in the Connecticut State Department of Education. This summer he receives a certificate of advanced graduate study in education administration from the University of Connecticut, where he is also enrolled in a PhD program. He was coauthor of an article, "Curriculum Design Through Operations Research" which will appear in the *Journal* of the American Educational Research Association. His current job deals with the development of a computerized management information system for the Connecticut State Department of Education.

Allen A. Kutz is with Winthrop Laboratories, a division of Sterling Drug, Inc., New York City. **Arnold S. Novick** works for Jono Textile Co., Hartford, Conn. . . . **Scott W. Ramsay** serves as a management analyst for the state of Maine in Augusta. . . . **David R. Speirs** is with Speirs Plumbing Old Lyme, Conn. . . . **James M. Wendell** has joined Dell Manufacturing Co., Inc., Farmington, Conn. . . . **Gregory F. Wirzbicki** works for Union Oil Co. of California at the Union Oil Center in Los Angeles.

1969

Born: to Mr. and Mrs. **Gordon J. Mears**, their first child, Donald Gordon, on August 6, 1974. Gordon is now a buyer for GE in Wilmington, Mass. . . . to Mr. and Mrs. **Edward A. Mierzejewski** their first son, Mark Edward, on January 16, 1975. They also have an older daughter. Ed has joined the Southeastern Virginia Planning District Commission in Norfolk as head of the transportation planning section . . . . to Mr. and Mrs. **Stephen E. Platz**, a son on April 19, 1975. Platz is a scientific programmer at Pratt & Whitney Aircraft in East Hartford, Conn. . . . to Mr. and Mrs. **Stephen O. Rogers**, a son, Timothy Drew, on June 26, 1974. Steve is plant supervisor for E.I. duPont de Nemours in Healing Springs, N.C. . . . to Mr. and Mrs. **Barry Shiffrin**, a daughter, Andrea Beth, on April 17, 1975.

Arnold Barr is an environmental scientist at the Radiation Management Corp., Philadelphia. . . . **Raj K. Chauhan** is with Parle Products Private LTD., Bombay, India. . . **Roger E. Dennison** works as an energy conservation engineer at R.G. Vanderweil Engineers in Boston. . . . **Andrew G. DiLeo** is a bridge maintenance engineer in the Arizona Department of Transportation, Phoenix, Ariz. . . . **Warren F. Follett** left Hughes Aircraft in Culver City, Calif. in January and is now with Emerson Electric Co. in St. Louis, Mo. He is an engineering specialist in the electronics space division. He, his wife, and daughter reside in nearby Hazelwood. . . . **Leslie T. Hatch** is a project manager at Buchart-Horn, Inc., York, Pa. He is a professional engineer.

Andrew J. Heman is a chemical engineer on the production staff at Tampa (Fla.) Electric Co. . . . **Gregory T. Hopkins** serves as a senior systems analyst at Republic National Bank of Dallas, Texas. He is also with Regent Engineering of Wilmington, Del. . . . **Charles A. Kalauskas** holds the position of senior transportation planner with the Central Transportation Planning Staff in Boston. Last year he graduated from the Graduate School of Design at Harvard with a master's degree in city planning. . . . Capt. **Anthony F. Leketa** is serving with the U.S. Army Engineers in Seoul, Korea. . . . **David Lieberman** is a senior systems analyst at Bausch & Lomb, Inc., Rochester, N.Y. . . . **Bidyut K. Rath** is a structural engineer for Brown & Root, Inc., in Houston, Texas. . . . Currently **Robert J. Rose** works as a production supervisor for DuPont at the Sabine river works in Orange, Texas, where he is supervising the construction and start-up of a new plastic product unit. . . . **Donald L. Sharp** serves as a senior engineer at Simmonds Precision in Vergennes, Vt. . . . Last May **John A. Taylor** received his MBA from the University of Rochester in New York. . . . **Charles E. Trent** has been transferred to Reading, Pa., with Crompton and Knowles Corp., where he is an analytical chemist.

South Pacific

Students who want the best secondary education provided in the tiny South Pacific island kingdom of Tonga can be found at Tonga High School where Peace Corps volunteer **Mervyn L. Hamer, '73,** has been teaching for the past two years. This elite public school, which selects the brightest students in Tonga, is known for its rigorous scholastic program and its top notch faculty. It enrolls 460 students and is located in Nuku'alofa, capital of this country of 95,000 people and 150 islands.

Hamer, who is one of six Peace Corps volunteers on the high school staff, teaches chemistry, general science, and mathematics. Although he had never taught previously, he went to Tonga a month after graduation and immediately plunged into teaching.

"I just got thrown right into the situation and started teaching," he said. "It was kind of a new thing at first.

"I really enjoy it and I enjoy the kids," he added. "You have your bad times but not very often. I usually feel pretty good at the end of the day."

Teaching science in an isolated, traditional island nation poses its own unique problems, he noted. "It's difficult in the sense that it's fairly technical, and kids here don't have any exposure to things like television and mechanical gadgets. You have to spend time teaching them things that we take for granted. But it isn't hard using visual aids and class demonstrations."

In class, Hamer stresses demonstrations and experiments so that students can see scientific principles for themselves. "They do most of the experiments themselves," he said. "It's easy to keep them interested. I'd rather let the kids do things themselves so that they get used to handling things. I figure that you learn what you do."

Most of his students are in the fifth form — roughly equivalent to the eleventh grade — and are studying to pass examinations for their school certificates, similar to high school diplomas. Hamer teaches them from a syllabus intended to prepare them for the exams. Both the syllabus and the tests are geared to New Zealand's educational system, which serves as the model for that of Tonga.

Hamer must cover the given topics on the syllabus, but his lesson plans and teaching methods are up to him. "I don't like to try to change things too much in class because passing this test means a lot to some kids," he noted. "I don't want to spoil their chances."

He teaches in English, Tonga's official language and the medium of instruction in the secondary schools. The students' first language is Tongan, however, and not all of them are adept at reading, writing and understanding English. "It's tough to give them problems that are really abstract," Hamer said. "English is their second language and they don't really understand them." The students are not allowed to speak Tongan at the school.

Hamer's school day runs from 8 a.m. to 4:30 p.m. After school he may work on lesson plans, correct papers, go to the movies, play handball or soccer with the students, or teach special night classes for students preparing for the exams.

He lives in Nuku'alofa, the only urban center in the country, in a small oceanside house with running water but no electricity. "Life is simpler here, so there are fewer things that can go wrong," he said. "I don't really have that much free time, but I find that things move a lot easier here."

A 1969 graduate of New Bedford (Mass.) High School, Hamer will wind up his two years of Peace Corps service in Tonga this summer. He is one of about 75 Peace Corps volunteers serving in Tonga in a wide variety of education, health and professional services programs. Around the world, about 7,900 Americans are serving as Peace Corps volunteers and trainees in 68 developing nations.

The Peace Corps is part of ACTION, the federal agency for volunteer service established in July, 1971 to administer volunteer programs at home and overseas.

WPI

1970

Married: **Kalvin W. Ngoon** and Miss Sandra E. Lilley on April 26, 1975 in Oxford, Massachusetts. The bride, a registered nurse, graduated from the University of Massachusetts School of Nursing in Amherst. The groom is a senior programmer at Syntex, Inc., Palo Alto, Calif.

James F. Bagaglio, a medex (medical assistant) trainee from the Dartmouth-Hitchcock Medical Center at Dartmouth College in Hanover, N.H., began a nine-month apprenticeship with Dr. Christian Briggs of Nantucket, Mass. in April. As a medex, he is trained in taking complete physical examinations and detailed medical histories. He is competent in taking blood samples, giving shots, checking blood pressure, and conducting lab work. Previously he was a supervisor at North Shore Children's Hospital in Salem. . . . **Francis L. Belisle, Jr.**, is with Hughes Aircraft in Culver City, Calif. . . . **Mark E. Brown** works as a lab supervisor at Minneapolis Medical Research Foundation, Minneapolis, Minn.

John D. Cattel serves as a district representative for Betz Labs in Trevose, Pa. . . . **Bernard J. Dodge**, who has been associate projects administrator at WPI for the past three years, is spending the summer studying Spanish as the Centro Intercultural de Documentacion in Cuernavaca, Mexico. In September he starts graduate studies in the area of instructional technology in the School of Education at Syracuse University. . . . **James H. George** is a chemical engineer at Uniroyal Chemical Co. in Naugatuck, Conn. . . **Robert J. Goodness** vice president and general manager of Man-Flight Systems, Inc., Worcester, appeared in a prime-time television special, "Fly Like a Bird", which was broadcast on Boston's Channel 4 on March 21st. The special highlighted the new sport of hang gliding and included film footage of Goodness and others participating in the sport on the outer sand banks of Cape Cod.

Robert Grillo works for F.H.W.A. in Hartford, Conn. . . . **Alan F. Hassett** has received his registration as a professional engineer in New York state and also has completed the requirements for a master's degree in sanitary engineering from Syracuse University. Chip is a project engineer for the civil engineering division of O'Brien and Gere Engineers, Inc., Syracuse. . . . **Roger Henze** received his master's degree in regional planning from Cornell University in January. For a year he and his wife, Judy, will be working as VISTA volunteers. They are being sponsored by the Yadkin Valley Economic Development District, Inc., in Boonville, N.C. Their project is to organize and set up a senior citizen center in Davie County. . . . **Thomas G. Mallory** is an applications engineer at USM Corp., Shelton, Conn.

1971

Paul B. Ash has been elected president of the Dover-Sherborn (Mass.) Teachers' Association. A chemistry teacher at the Dover-Sherborn Regional High School, he was a delegate to the Mass. Teachers' Association Convention in 1974-75 and served on the committee to draw up the constitution of the Dover-Sherborn Teachers' Association. He chaired the committee to form the Honor Society at the high school. As president of the 142-member teachers' association, he hopes to improve communications between the communities, the administration, the faculty and the school committee. . . . 2/Lt. **Richard C. Brunet** has been awarded silver wings upon graduation from U.S. Air Force navigator training at Mather AFB, California. He is being assigned to MacDill AFB, Florida, for flying duty with a unit of the Tactical Air Command.

John N. Brusseau was recently promoted from assistant to associate professor in the school of engineering at Western New England College, Springfield, Mass. . . . **Steven A. Clarke** is a biomedical engineer at Thermo-Electron Corp., Waltham, Mass. . . . **Gregory S. Dickson** is now a manufacturing supervisor at the Allyns Point Plant of Dow Chemical Co. in Gales Ferry, Conn. . . . **William B. Ericson** holds the post of design engineer at Digital Equipment Corp., Marlboro, Mass. . . . The Rev. Mr. **Anthony S. Kazarnowicz** was ordained to the priesthood on May 17 at Our Lady of Jasna Gora Church in Clinton, Mass. He studied for the priesthood at SS Cyril and Methodius Seminary, Orchard Lake, Mich., and completed his deacon internship in Our Lady of Jasna Gora parish.

James Lavallee is a field engineer at Sargent & Lundy in Chicago. . . . **Scott McCandless** is now an adjunct assistant professor in the CE department at WPI. . . . **John R. Oscarson** works at Pfizer Chemical, Groton, Conn. . . . **Donald K. Peterson** has been promoted to senior investment analyst at State Mutual Life Assurance Company of America in Worcester. In 1973 he received his MBA from Dartmouth and then joined State Mutual's securities organization. Last year he was promoted to investment analyst. . . . **Steven M. Purpura** has opened his own glass business, Wayside Glass & Mirror Company, on Rte. 20 in Marlboro, Mass. Previously he was employed as a glazier at Federal Glass in Framingham. . . . **Richard San Antonio is** a medical student at Washington University Medical School, St. Louis, Mo. . . . **Charles A. Sumner** works as a design engineer at Worcester Controls Corp., West Boylston, Mass.

Noel Totti III is a third-year medical student at the University of Puerto Rico. He received his MS in biomedical engineering from Duke University. . . . **Urmas A. Volke**, who married Miss Jacquelyn M. Catino, a graduate of Salter Secretarial School last October, is employed by Dynamac Inc., Natick, Mass.

William R. Whitworth is now a production supervisor in the Fisher Body Division of G.M.C. in Trenton, N.J. . . . **Robert D. Williams** is with CETA in Fitchburg, Mass.

Michael J. Winn writes that he is an independent fisherman. He is located in Orleans, Mass.

1972

Married: **Konstantin Eliadi** and Miss Carol Ann Lake on April 27, 1975 in Northboro, Massachusetts. The bride graduated from Quinsigamond Community College, Worcester, and from the University of Massachusetts, where she received a bachelor's degree in nursing. She is a registered nurse in the St. Vincent Hospital emergency room. Her husband is working for his master's degree in environmental engineering at WPI. . . . **James A. Hardy** to Miss Mary J. Kniep on May 17, 1975 in Rochester, New York., Mrs. Hardy graduated from Marquette University where she received her BS degree and the University of Rochester where she received her MS degree. She is a registered nurse. Hardy is a graduate student at the University of Rochester. . . . **David P. Riedel** and Miss Rima S. Perlstein recently in Hartford, Connecticut. The bride graduated from C.W. Post College and is now a graduate student in theater at the University of Connecticut. The groom is a graduate student in computer science at the University of Connecticut.

James J. Altoonian is an investment analyst at Detroit Bank & Trust, Detroit, Mich. . . . Currently **Gregory S. Blood** is assistant regional superintendent for Swift & Co. in Union, N.J. . . . **James P. Colangelo** writes that he is a third-year medical student at St. Louis (Mo.) University. . . . **David S. Cummings** is now a manufacturing engineer at Norton Co., Worcester. He and his wife, Bonnie, recently purchased a beautiful 200-year-old farm in Princeton. . . . **Alan H. Fraser** is with the Dream Machine in Worcester Center. . . . Dr. **Terry A. Fuller** writes that he is a research biophysicist at Sinai Hospital of Detroit. . . . **Rae H. Johnson** is a construction service engineer at Warner & Swasey in Worcester. . . . **David L. LeBlanc** now serves as automotive territory manager at Gates Rubber Co., Denver Colo.

Frank D. McMahon is a materials engineer at Haynes, Hollon & Assoc., Inc., Dallas, Texas. . . .

Randall Partridge, reportedly one of the world's foremost experts in formose (the conversion of carbon dioxide to sugar) has been participating since March in a formal scientist exchange program between WPI and the Soviet Union in support of space travel research. To date, research attempts to produce edible sugar from the exhaled breath of astronauts have been unsuccessful. If an edible sugar could be produced, it would provide a carbohydrate which would be important in feeding the crew for the manned Mars shot being planned by NASA. Partridge will report to WPI on his progress with the Soviet scientists. The trip was funded by the National Science Foundation, the exchange program being coordinated by WPI Prof. Alvin H. Weiss. Partridge is a chemist with the Mobil Oil Co., Paulsboro, N.J.

Wilfred L. Prue works for the Naval Ordnance Station in Indian Head, Md. . . . **Bruce Rosser** is a senior engineer in the New Jersey Department of Transportation in Trenton. . . . **Dinesh V. Shah** serves as a stress analyst for All States Design & Development in Houston, Texas. . . . **Joe Spurlock** has been hired as a chemistry teacher and basketball coach at Windham (Me.) High School. Earlier he taught chemistry at Tourtelotte High School, Grosvenordale, Conn. During his five years as a basketball coach, his team reached the Connecticut state tournament twice. . . . **Thomas W. Staehr** is a materials engineer for the Tennessee Valley Authority at the Bellefonte Nuclear Plant in Hollywood, Ala. . . **Kurt M. Wusterbarth** serves as a project engineer at Hercules, Inc., Lake Charles, Louisiana.

1973

Married: **Charles M. Henrickson** and Miss Pamela J. Carlson in Worcester on April 12, 1975. The bride attended North Park College, Chicago, and Worcester State College. Her husband is a manufacturing engineer at General Electric Co., Fitchburg, Mass. . . . **Clifford P. Peterson** and **Ellen M. Church, '75,** of Millbury, Massachusetts on October 26, 1974. **Joseph J. Magri, Jr.,** was an usher, and **Helen Weimerskirch, '74,** and **Vicki Cowart, '75,** bridesmaids. Mrs. Peterson is a computer programmer with the American Telephone & Telegraph Co. in Piscataway, N.J. The groom works for the Bank of Tokyo's International Operations Department in New York City. . . . **Lt. Richard F. Sliwoski** (U.S. Army) and Miss Leslie L. Pierce on May 17, 1975 in Forestville, Connecticut. The bride received her associate's degree from Becker Junior College. Her husband is with the Army Corps. of Engineers in Dexheim, Germany. . . **Kenneth R. Therrien** and Miss Carol E. Babineau on May 3, 1975 in Gardner, Massachusetts. Mrs. Therrien graduated from Quabbin Regional High School. The groom works for American Standard Co., Windsor Locks, Conn.

Abdulazeez M. Al-Baghli serves as a television engineer for the Ministry of Information in Kuwait. . . . **William N. Ault,** a product engineer at Norton Co., Worcester, participated as a session leader in the 1975 ASAM International Technical Conference and Exhibition held in Chicago last May. His topic was: "Surface Integrity: How Much Do You Need and How Do You Get It?" . . . **Duane Barnhart,** SIM, works as superintendent of forming at Norton Co. . . . **Paul R. Ciaccio** is presently attending Massachusetts College of Optometry in Boston. . . . **Robert DiGennaro** is an electrical field engineer for GTE Sylvania in Waltham, Mass. . . . **Stephen F. Dowling** is a sales engineer at Nash Engineering Co., Norwalk, Conn.

Recently **Edward S. Jamro** received his MS in environmental engineering from the University of Massachusetts. He is now an environmental engineer in the corporate engineering department at Monsanto Chemical Company in St. Louis, Mo. . . . **Stephen E. Kaminski** works for the Rural Electrification Administration in Washington, D.C. . . . **Ken Larsson** is with Boswell Engineering in Waldwick, N.J. . . . **James M. Mercik** is an actuarial student at Aetna Life & Casualty, Hartford, Conn. . . . The Raytheon Co., Bedford, Mass., has hired **Robert H. Newman** as a software engineer. . . . **Gerald Otte** is teaching with the Peace Corps in West Malaysia. . . . **Einat H. Pilzer,** who received her MS from MIT last year, works for Nuclear Energy Systems in Monroeville, Pa. . . . **Diane Pritchard** is a computer programming instructor at Providence (R.I.) College. . . . **Dinesh S. Shah** is with EBASCO Services, Inc., New York City. . . . **Paul M. Watson,** a research engineer, works at Amoco Chemical Co., Naperville, Ill. . . . **Mark D. Whitley** is a production engineer at Shell Oil Co., New Orleans, La.

1974

Married: **Dean C. Anderson** to Miss Pamela J. Bray on September 14, 1974 in Worcester. The groom holds a field engineering position with Envirotech Systems, Inc., of California. Currently he is assigned to a project in Maynard, Mass. . . . **Eugene R. Lukianov** and Miss Debra Ann Garbarino last spring in Roslindale, Massachusetts. The bride, a graduate of Holliston Junior College, is a respiratory therapist. The groom works for Bendix Co., South Bend, Indiana. . . . **Gordon G. Woodfall** and Miss Joanne A. Desaulnier in Pomfret, Connecticut on August 24, 1974. The bride is employed as a secretary for the Motor Lease Corp. in Farmington, Conn. Her husband is production control analyst at Fafnir Bearing Co., New Britain, Conn.

Born: to Mrs. **Elaine Garwood Henshon** and Mr. Henshon, a son, on March 31, 1975. . . . Recently to Mr. and Mrs. **Albert Simonti,** a daughter, Alicia. Al is still with Stone & Webster, Boston.

Bruce R. Beaupre writes that he is classified as a technical supervisor and is presently doing interplant project engineering and consulting with BASF Wyandotte Corp., Wyandotte, Mich. . . . **Douglas Borgatti** is working for his master's degree at Manhattan College in Bronx, N.Y. . . . **Leonard J. Brzozowski** and **Lee D. Turner** recently did some graduate research for Prof. Dennis L. Meadows (author of *The Limits to Growth*) at the Amos Tuck School of Business at Dartmouth College. They are spending the summer building models of the World Food and Energy Systems for the U.S. General Accounting Office in Washington, D.C. . . . **Stuart A. Daniels** works for Boston Insulated Wire & Cable Co., Plymouth, Mass. . . . **Edward S. Dlugosz** has taken a leave of absence from Camp Dresser & McKee, Inc. and is doing graduate work at Northeastern University, Boston. . . . **William Dyson** is a graduate student in physics at Central Michigan University.

Edward Gordon is assistant engineering programmer at Burroughs Corp., Detroit, Mich. He is also a graduate student at Wayne State University. . . . **Joseph Lemanski** works for ARP Instruments, Inc., Newton, Mass. . . . **Robert E. Lindberg** is a research assistant and assistant varsity swim coach at the School of Engineering at the University of Virginia in Charlottesville. . . . **Robert S. Parnass** has been employed by the Systems Research and Development Dept. of Ultimacc Systems, Inc., Maywood, N.J. The company designs and sells mini-computer systems. . . . **Stephen Rubin** is with EMC Controls in Cockeysville, Md. . . . **Lawrence D. Patty** holds the post of associate engineer at Electric Boat in Groton, Conn. . . . **Frederick L. Williams** is an associate scientist at Leeds & Northrup in North Wales, Pa.

MORGAN

CONSTRUCTION COMPANY

15 Belmont Street, Worcester, Mass. 01605

Serving the Ferrous and Non-Ferrous World Markets since 1888 as Engineers and Manufacturers of Rolling Mills, Morgoil Bearings, Wire Drawing Machinery and Furnace Equipment

Edwin Anderson, who for 44 years was a physics lecture assistant at WPI, died on April 18, 1975 in Worcester. He was 68.

As a physics lecture assistant, Mr. Anderson set up experiments for students. He retired two years ago. A Worcester native, he was a member of the Tech Old Timers and the Masons. His hobbies included antique collecting and gardening.

Ivan E. "Pete" Bigler, 83, head coach at WPI from 1921 to 1941, died on April 1, 1975 at his home in Coldwater, Michigan.

He was born in Webster, Ohio in 1892 and graduated from Juniata College in Huntingdon, Pa. in 1916. Later he received a master's degree in physical education from Springfield College. While a college student he played professional baseball with the Philadelphia Athletics in the summers. After graduation he was a utility infielder and third baseman with the St. Louis Browns and played with such notables as George Sisler and Eddie Plank.

In 1920 he resigned as a captain in the Marine Corps and joined WPI as a coach in basketball, baseball, and football. He coached the football team to its first undefeated season in 1938. During the early 1920's Bigler's basketball teams were some of the best in New England. The New England Championship team's picture is displayed in the Basketball Hall of Fame in Springfield, Mass.

Mr. Bigler began his career in the production and count controls departments at Wyman-Gordon in 1941. The next year he coached the company's baseball team to the Industrial League and city championships. He was an avid hunter and fisherman and instructed Shrewsbury Sportsman's Club members in the use, care, and safety of firearms.

Karl E. Herrick, '10, of Laguna Hills, California died in January.

From 1912 until 1950 he was with Norton Co. in Worcester. He belonged to Phi Gamma Delta and the Shrine.

He was born on August 31, 1885 in Winchendon, Mass., later graduating from WPI in 1910 as a chemist.

James P. Allardice, '14, died on May 7, 1975 in Somerset, Massachusetts.

A native of Fall River, Mass., he was born on June 3, 1891. In 1914 he graduated from WPI with his BS in civil engineering. A registered professional engineer and land surveyor, he began his career in the Fall River Engineering Department. Later he worked for Stone and Webster. Prior to his retirement in 1959, he was with the State Department of Public Works.

Mr. Allardice served for two terms on the Somerset Planning Board. He belonged to the Massachusetts Consistory, SPRS, 32nd degree; and the Retired State, County, and Municipal Employees Association.

Leon W. Dunbar, '16, of Tampa, Florida passed away on January 24, 1975 following a long illness.

He was born on April 7, 1893 at Canadensis, Pa. In 1916 he graduated as a mechanical engineer from WPI. For many years he was a district manager for the Clarage Fan Co., Cleveland, Ohio from which he retired in 1955. Mr. Dunbar was a member of Alpha Tau Omega fraternity and Skull.

Retired Army Col. **Harold A. Maxfield, '16,** a former faculty member at WPI, died on May 19, 1975 at the age of 81.

He was born on Sept. 24, 1893 in Lowell, Mass. and graduated as an electrical engineer from WPI in 1916. Following duty as an Army officer in France during World War I, he became a research engineer at the Westinghouse Research Laboratory. From 1921 until 1946 he was a professor in the electrical engineering department at WPI. He was head of the EE Department at the U.S. Naval War College in Newport, R.I. from 1947 to 1952, and also lectured at Brown University. For two years he was commandant of the U.S. Army Officers Reserve School in Rhode Island. From 1952 until 1959 he was a professor and EE department head at Norwich University, where he retired as a Professor Emeritus.

Col. Maxfield, who supervised over 1200 students and instructors at the Coast Artillery School (Monroe, Va.) during World War II, was a life member of AIEE and ASEE. He was also a registered professional engineer in Massachusetts and belonged to Tau Beta Pi, Sigma Xi, and Lambda Chi Alpha. He wrote many articles on teaching and supervised the writing of "Confidential Training Manual, U.S. Navy." He also instituted a course in industrial engineering which was taught at WPI from 1924 until 1950.

Winthrop S. Pratt, '16, of Darien, Connecticut passed away last year.

He was born in 1891 in Grafton, Mass., later becoming a student at WPI. During his career he was with Heald Machine Co., Worcester; Toledo (Ohio) Machine and Tool Co.; National Acme Co., Windsor, Vt.; Waltham (Mass.) Watch Co.; and William L. Fletcher, personnel counselors, in Boston. He was a member of Phi Gamma Delta fraternity.

Walton B. Scott, '16, of San Diego, California died suddenly on February 18, 1975 at the age of 79.

A native of Danielson, Conn., he later graduated from WPI as a chemist. During his career he was with the U.S. Bureau of Mines; National Aniline and Chemical Co., Buffalo, N.Y.; and Hooker Chemical Corp., Niagara Falls, N.Y., where he retired as technical superintendent in 1961 following 35 years of service.

Mr. Scott, a former president of the Western New York Chapter of the Alumni Association, belonged to Delta Tau, now Sigma Phi Epsilon fraternity, and served as chairman of the Western New York section of the American Chemical Society. He was with the Chemical Warfare Service (defense research) during World War I and was a member of Sigma Xi and Tau Beta Pi.

John O. Archibald, '18, died in East Aurora, New York on March 29, 1975.

He was born on June 5, 1895 at Santa Cruz, Calif. After studying at WPI, he was with Gould Storage Battery Co., Depew, N.Y. for eight years. He then became a manufacturer's agent in the refractory and foundry supply field, a business which he operated in Buffalo prior to his retirement in 1963.

Mr. Archibald was a pioneer in amateur radio, a field he entered in 1911 and maintained an interest in throughout his life. He belonged to Phi Gamma Delta fraternity, was a past president of the Western New York chapter of the Alumni Association, and served as a lieutenant in the U.S. Army Signal Corps during World War I.

Myron C. Goddard, '21, of Westerville, Ohio passed away last December.

He was born on June 29, 1896 in Sidney, Me., and graduated from WPI in 1921 as an electrical engineer. From 1921 until 1924 he was with Western Electric Company and from 1925 until his retirement in 1961 with Bell Telephone Laboratories, Inc. He belonged to AIEE.

Raymond A. Lane, '21, of Florence, South Carolina, died on November 22, 1974.

He was born on August 30, 1898 in North Brookfield, Mass. In 1921 he received his BSEE from WPI. During his career he was with Western Electric, Chicago; Westinghouse Electric and Manufacturing Co., East Pittsburgh; Safety Car Heating & Lighting Co., New Haven; F.A.D. Andrea, Inc., Long Island; and Aerovox Corp., Brooklyn.

Later he was chief engineer at Pyramid Electric Co., Darlington, S.C. After retiring from General Instrument as director of research and engineering in 1964, he spent a year in Mexico City as a consultant engineer at Mexican Capacitor Co. He was a life member of AIEE and a Shriner.

C. Sture Carlson, '26, passed away at his home in Harwich, Massachusetts on April 18, 1975. He was 71 years old.

For thirty years he was a plant engineer at Norton Co., Worcester, retiring in 1969. While with the company he traveled extensively in this country and abroad doing construction work. He was also associated with Mid-West Abrasive Co; Peninsula Grinding Wheel Co.; Tennessee Eastman Corp; the city of Worcester; International Power & Paper Co; Big Four R.R.; and Blackstone Valley Gas and Electric.

He was born on March 2, 1904 in Varmland, Sweden and graduated from WPI as a civil engineer in 1926. A member of Phi Sigma Kappa, Skull, and the Cape Cod Power Squadron, he was also active in scouting and Algonquin Council BSA for over twenty years. He served as town engineer in Northboro and was a registered professional engineer.

Wallace H. Tucker, '26, died at his home in Buffalo, New York on March 20, 1975. He was 70.

A native of Webster, Mass., he graduated from WPI in 1926 as an electrical engineer. For many years he was a sales engineer for Westinghouse Electric Corp., Buffalo. He retired in 1965.

Henry C. Waite, '27, of Cuyahoga Falls, Ohio passed away on February 27, 1975.

Born in Holyoke, Mass., on December 31, 1904, he later was a student at WPI. At the time of his retirement he was foreman at Hammermill Paper Co. and was the owner of Bix Service Furniture Stripping Co. He belonged to Alpha Tau Omega.

Russell E. Cobb, '28, died on May 19, 1975 at his home in Spencer, Massachusetts. He was 77.

He retired in 1963 after 34 years as fire protection engineer for Factory Insurance Association, Hartford, Conn. A native of Holden, Mass., he was born on April 20, 1898. After graduating as a mechanical engineer from WPI in 1928 he joined the Factory Insurance Association where he worked until retirement.

Mr. Cobb was a former member of the Sons of the American Revolution.

Wells F. Bausman, '32, a self-employed mechanical engineer, died on March 11, 1975 in Springfield, Massachusetts. He was 63.

He was a native of Chicopee, Mass. and graduated with a BSME from WPI. During his career he was associated with National Equipment Co.; United American Bosch Corp.; duPont; and Mill River Tool Co., Springfield, Mass.

Mr. Bausman was a Navy commander in World War II, serving in the South Pacific. He received a commendation as a submarine repair officer. A member of Sigma Alpha Epsilon fraternity, he also belonged to the Society of Professional Engineers.

Richard H. Martin, '32, died in Worcester on March 31, 1975. He was 64 years old.

Five years ago he retired as a civil engineer from E.J. Cross Co., Worcester, after 32 years of service. He was born in Worcester on August 9, 1910 and graduated from WPI in 1932.

Mr. Martin was secretary-treasurer of the Boylston Sportsmen's Club from 1949 to 1973. During World War II he was with the Army Engineer Corps in the Pacific theater.

Francis J. Crowley, '34, a tax consultant with H & R Block, died in Scottsdale, Arizona in March.

A native of Fall River, Mass., he was born on January 13, 1913. During his lifetime he was an executive with American Tool & Machine; Harshaw Chemical; Ferro Chemical Corp., Cleveland, where he served as vice president; and Crowley-Thompson Chemical Co., Cleveland, where he was president. Two years ago he retired as vice president of the Essex Chemical Co. in Clifton, N.J.

Mr. Crowley was a member of the American Chemical Society, the American Ceramic Society, and the Chemists Club of New Jersey. He was a community director of the Red Cross and a past president of the Cleveland chapter of the Alumni Association. He graduated from WPI in 1934.

Marcus Abelson, '35, a retired engineer for the U.S. Department of Interior, died on March 4, 1975 in Ross, California.

Born on August 15, 1911 in Worcester, he received his BSEE from WPI in 1935. After working as an engineer at Worcester State Hospital and the Federal Power Commission in Washington, D.C., he joined the Dept. of the Interior, also in Washington. While with the department he was transferred to Boston, where he became a regional coordinator. Last year he retired following 35 years of service.

In July of 1973 he received a citation for meritorious service from former Secretary Rogers C.B. Morton. He was a certified professional engineer.

James J. Gushaw, '35, of Chesterfield, Missouri died on March 20, 1975 at the age of 62.

He was born in Korce, Albania on September 20, 1913. In 1935 he received his BSCE from WPI. From 1935 until 1940 he was with Stone & Webster Engineering Corp. Later he was an associate engineer in the Panama Canal Zone, served in the U.S. Army, and worked for Weyerhaeuser Timber Co. In 1950 he joined Sverdrup & Parcel and Associates, Inc., St. Louis, Mo. At the time of his death he was principal engineer and project manager of the consulting firm.

Mr. Gushaw, a registered professional engineer in ten states, three Canadian provinces, and the Panama Canal Zone, had served as an elected officer in the Professional Engineering Society. He was also a member of the American Association for the Advancement of Science. For his work with the Boy Scouts of America and the Queen Scouts of Canada, he was awarded a trophy in 1974. He was active with the United Fund, Red Cross, and YMCA, and also served as a member of the WPI Admissions Committee and as vice president of the New York chapter of the Alumni Association.

Joseph C. Putelis, '40, died in Worcester on March 25, 1975 at the age of 57.

He was a chemist and sanitary engineer for 34 years for the city of Worcester and also worked part time at the Worcester Foundation for Experimental Biology in Shrewsbury.

Mr. Putelis was born on March 2, 1918 in Worcester and belonged to the American Chemical Society. He graduated from WPI in 1940.

Robert S. Foster, '44, associate laboratory director at Columbus (Ohio) Coated Fabrics Corp., died in February.

He was born on February 13, 1923 in Boston and graduated as a chemist from WPI in 1944. After service with the U.S. Navy, he became a research assistant at M.I.T. and later a graduate student at Ohio State. For many years he was with Columbus Coated Fabrics. He was a member of Lambda Chi Alpha fraternity.

Thomas W. O'Brien, '46, was killed in an airplane crash in Barnwell County, South Carolina on June 24, 1974.

He was a production test pilot with Grumman Aerospace Corp. in Savannah, Ga., where he also served as chief training instructor. He was born on August 15, 1925 in Portsmouth, N.H.

Paul J. Sroka, '64, was killed in a gyrocopter crash in Ocotillo Wells, California last winter. He was 32 years old.

Born on January 27, 1943 in Webster, Mass., he graduated as an electrical engineer from WPI in 1964. In 1965 he received his MSEE from Polytechnic Institute in Brooklyn and in 1970 he received his MS in space physics from U.C.L.A.

At the start of his career he was associated with Wheeler Laboratories, Smithtown, N.Y., and Hazeltine Corp., Plainview, N.Y., where he was a senior engineer in the research lab. Later he joined Transco Products, Inc., in Venice Calif., as a group supervisor. From 1972 to 1974 he was a senior engineer in the electro-magnetic systems division at the Raytheon Company in Goleta, Calif. At the time of his death he was a senior staff engineer with Teledyne Micronetics in San Diego.

Mr. Sroka, whose article, "Nomograph Saves Time In Converting Antenna Gain," appeared in the March '74 issue of *Microwaves,* was a member of Sigma Pi, Eta Kappa Nu, and Sigma Xi.

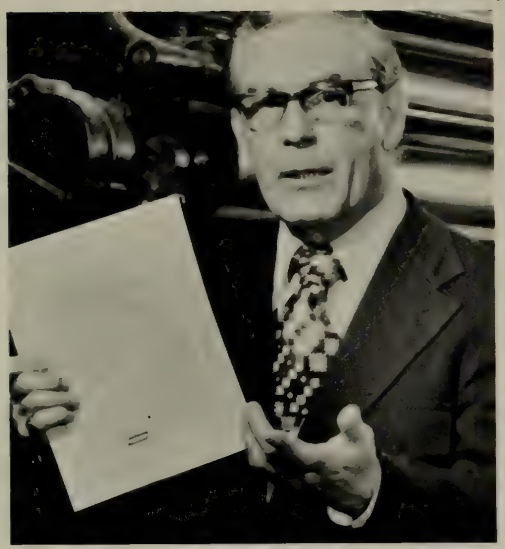
Mr. Keen, Tracer of Missing Persons — We have a few hundred people we'd like to have addresses for

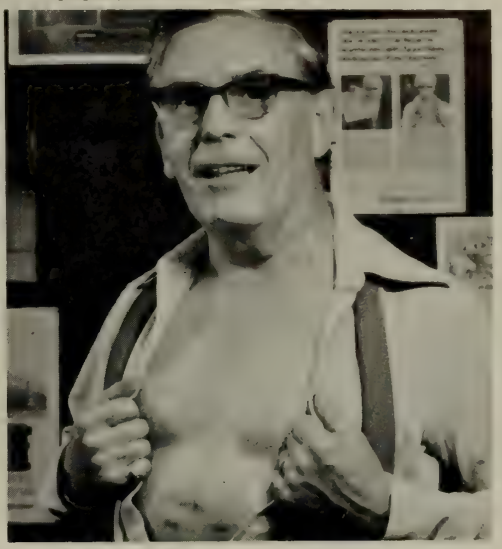
If any **Journal** readers can help us locate any of the alumni on the following list, we'd be most grateful.

Samuel A. A. Aaron '39
S. Richard Abbott '39
Marcus Abelson '35
Edward J. Abendschein '35
Winfred M. Adams '02
David Adelstein '28
David M. Alden '70
LT. J. Warren Alford '61
William S. Allan Jr. '43
James P. Allardice '14
Elliott A. Allen '08
Subhashchandra N. Amin '67
Alfred F. Andersen '41
Frederick A. Andersen Jr. '75
David D. Andre '70
Stanley C. Andrukonis '53
Stanley J. Andrysiak '64
Edward L. Anton '18
John T. Apostolos '65
Antonio Aranguren '56
Karen L. Arbige '75
John D. Archibald '18
Muammer Arikan '70
David B. Armitage '70
Ozden Aslan '60
William F. Atwood Jr. '36
Sidney H. Avery '24
Hooshang Azma '75
Chester A. Bacon '03
Thomas J. Bagley '53
David A. Bailey '72
Louis J. Baldini '44
Kinsley A. Ball Jr. '49
Robert A. Balouskus '68
John J. Balsavage '37
Philip L. Barbaccia '50
Benjamin B. Barker Jr. '48
Stephen J. Barlow '71
Bernard Baron '64
Robert W. Bartlett '16
Wells F. Bausman '32
Paul M. Bazinet '73
Edward G. Beckwith '97
John A. Beede '59
Jacques R. Belair '61
Marcel R. Benjamin '67
Irwin G. Benkert '46
Alan E. Benson '59
Jeoffrey N. Berg '71
Thomas G. Bergin '30
Edward Berman '73
Robert G. Bertrand '66
Geetha Bhat '72
Satish H. Bhatt '66
Vithal Kanji Bhimani '73
Jose R. Biamon '47
George A. Bijur '21
Roger R. Billings '58
John A. Birch '34
Karl H. Bissell Jr. '53
Gaetano Biuso '46
Robert A. Bleau '59
George R. Bolduc '61
Ju Hak Bong '72
Kayhan Boro '61
Michael W. Boyd '65
Haines J. Boyle '62
Yigit Bozkurt '62
Arthur B. Brainerd Jr. '32
James R. Braithwaite '67
Santo M. Bramande '57
Henry W. Brandt '60
Robert D. Britton '62
Kenneth G. Broman '25
Arthur D. Brook '60
Ellis R. Brown '33
Harrison G. Brown '12
Richard T. Brown '44
Burgess P. Brownson '41
Lennart Brune '40
Thomas G. Burns '72
David M. Burwen '66
George W. Busby Jr. '36
George Cagen '43
John F. Campanella '70
Donald M. Campbell '45
Mehmet I. Can '62
Athanassios H. Canatsoulis '67
Demetrios H. Canatsoulis '70
Donald T. Canfield '19
William M. Cannon '60
Robert M. Cape '35
David I. Caplan '48
Miss Joyce L. Caplovich '73
Fred B. Carlisle '17
C. Sture Carlson '26
Ernest J. Carlson '50
Francis D. Carlstrom '31
Fred A. Carmody '50
Lyle W. Carpenter '41
Gary P. Cassery '66
Victor B. Castellani '62
Fernando Castillo '67
Omer M. Cavusoglu '66
Paul Y. Chan '63
John H. Chapman '37
Ramjibhai Chaudhari '72
Krishnakumar V. Chaudhary '64
Mon-Her Chen '73
Robert A. Cherry '68
Suman Chamanlal Choksi '74
Tzu-Hzu Chou '25
George C. Chow '27
Yat W. Chow '27
Morris C. Chu '42
Dr. Jo-Chad Chueh '60
Bok Nam Chung '73
James E. Clampett '55
James H. Clancy '90
F. Boardman Clapp '05
Dr. William G. Clark '69
Class of 1934 '34
Paul A. Cnossen '56
Russel E. Cobb '28
Martin R. Cohen '53
Donald C. Connelly '70
John M. Considine '46
George M. Cooley '51
Alan K. Cooper '64
Richard D. Cooper '60
Lester E. Couture '73
Ellsworth R. Cramer '51
Charles E. Crang '25
Francis J. Crowley '34
Eduardo Cruz '61
Edward L. Cullen '96
Gungor Dagistanli '60
Kathryn H. Dagostino '73 (Zawislak)
John F. Daly '58
Patrick S. Daly '73
Per Arthur Damslet '74
Anthony L. Daoundakis '46
Mahendra K. Dave '67
Shailesh V. Dave '66
Dr. Sharadchandra M. Dave '71
Philip K. Davis '21
Ronald P. Defalco '73
John V. Delany '38
Ernest E. Demar '53
Michael J. Demoga '70
Raymond G. Desrochers '35
Harold J. Devlin '48
Arthur M. Dickey '65
Mahesh S. Dixet '65
Edward F. Donohue '32
Terry W. Donovan '61
Sharad B. Doshi '66
Forest M. Douglass Jr. '21
Cornelius J. Doyle '33
Evan G. Duane '61
James R. Duca '61
John A. Dufault '24
Leon W. Dunbar '16
Alfred E. Dunham '65
Harry W. F. Dunklee '01
Everett W. Dunlap '43
Robert J. Dunn '58
Terrence M. Dupuis '60
Victor A. Dushku '64
LT. Robert B. Edwards '65
LT. Robert J. Ellis '68
Warren L. Ellis '15
Frank Ellsworth '37
Carl G. Englund '20
Alvar O. Ericson '30
Wilton A. Ericson '46
Eric S. Ericsson '19
Howard M. Estes '20
Roger E. Etherington '70
Capt. Harry G. Fager Jr. '64
Nadher Family '72
Joseph T. Fanning '22
Thomas W. Farnsworth '16
Roland O. Farrar '37
Louis C. S. Fernandes '62
James Ferraris '75
George H. Finlay '28
Thomas E. Fitzpatrick '68
Gerald Fleit '50
August L. Flotteron Jr. '47
Allan W. Forbes '10
Irving W. Forde '39
Richard A. Formato '68
Ralph S. Forsstedt '06
Robert S. Foster '44
James F. Fournier '57
Edward T. Fox Jr. '30
Burton Franklin '42
Rein C. Freeberg '67
Robert A. Frenette '64
Theodore C. Fritz Jr. '53
Philip R. Gaudet Jr. '67
David B. George '48
Gordon B. George '32
G. Wayne Gibbs Jr. '70
Frank G. Gifford '16
George G. Gleisberg '34
Myron C. Goddard '21
Francis J. B. Goddu '62
Suat Gonen '61
Ronald S. Gosk '67
Milton W. Graff '21
James Gordon Graham '72
Richard C. Graham '67
Robert N. Gregoroff '46
Thomas W. Greisamer '63
Elmer R. Griffith Jr. '49
Ralph H. Griswold '62
Joseph D. Grzyb Jr. '57
Roland H. Guay '47
Stanley M. Gunn '13
Jagdish C. Gupta '70
James J. Gushaw '35
Preston W. Hale '24
George E. Hammond '64
Robert E. Hancock '15
Francis W. Harney '22
Clifford R. Harris '96
George H. Harrison '07
Robert P. Hart '71
Richard D. Hartley '62
G. William Hartman '63
David L. Hartwell '42
Frederick V. Haskell '26
Lewis S. Haskins '31
Walter H. Hatch '46
Roland D. Hawkins '15
C. William Hayes '61
Howard H. Haynes '07
Stephen S. Haynes '33
Capt. Herbert W. Head '63
Thomas J. Healey Jr. '36
Robert F. Hellen '67
Christopher A. Herbert '46
Karl E. Herrick '10
Charles A. Heyelman '48
Capt. John Richard Hilyard '68
Morey L. Hodgman '50
Cmdr. Kenneth B. Hofstra '45
Frank O. Holmes Jr. '35
Raymon T. Holmes '24
Leon Hoogasian '51
William M. Hovenesian '46
Laurence M. Howarth '39
George K. Howe '01
John E. Howe '27
1 / LT. Edward E. Howe '70
Prof. Douglas E. Howes '20
John D. Hoyt '68
Andrew Ann-Shong Huang '70
Roger B. Hubbell '09
Albert L. Humphrey '12

"The day I had this book printed, I had no idea I'd wake up six months later with Tygon® tubing protruding from my abdomen."

Stanley C. Deen, Production Manager
Northlich, Stolley, Advertising Agency for Norton Company and Tygon Tubing Products





I had open heart surgery — a saphenous vein transplant. And I'm not trying to tell you I came out of the anesthetic shouting "Hooray for Tygon!" I wasn't shouting anything; the respirator tube in my throat prevented uttering a word.

But, I will tell you it was reassuring to discover later that the tubing used to maintain my vital bodily functions was Tygon tubing.

Because I've worked with Norton for 11 years and I've observed first-hand the rigorous quality checks that go into Tygon tubing. Raw materials checks. Production checks. Batch-to-batch consistency checks.

And last March, I supervised production of the book I'm holding here. Probably the only one of its kind in existence. It documents, quantitatively, all the health and safety claims made for Tygon tubing.

Tests cited in it exceed requirements for a USP Class VI plastics rating. There's no other plastic tubing we know of that's subjected to such extensive testing with results recorded and published for all the world to see.

But only when I lay in intensive care did I realize the full significance of these very special precautions to patient and surgical team. Recovery depends on them, I am so happy to be able to tell you.

Tygon tubing formulations S-50-HL and S-54-HL are specifically developed, produced and tested for safety and performance as a biocompatible, clear, flexible composition, and are the accepted standard of excellence for many applications in the health care field.

Their physical, chemical and biological properties insure maximum safety, reliability and performance when used where direct and indirect contact with body fluids, tissues and parenteral solutions are required.

Based on current guidelines, both formulations meet criteria of a USP Class VI rating. Additional biological tests, beyond requirements of Class VI materials, are conducted to assure the highest level of safety required in biomedical applications.

34-116

AVAILABLE FROM YOUR AUTHORIZED TYGON TUBING DISTRIBUTOR

NORTON PLASTICS AND SYNTHETICS DIVISION
TUBING AND MOLDED PRODUCTS AKRON, OHIO 44309